



Koinonia: A Moving Form of Transportation

— 2020 Transportation Policy White Paper



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Transportation, Moving Towards a Better Future



MOTC stands for the Ministry of Transportation and Communications. As can be seen in the name, apart from managing transportation, the Ministry also shoulders the burden of handling the interactions and communications between people. Did you know that in ancient Greek, transportation and moving were the same word, “koinonia”, symbolic of the moving moments in life that were possible thanks to transportation?

In the past few years, Taiwan’s society has faced rapid changes. Not only has the country become an aged society, but the challenges of low-birth rates have also started surfacing. On the other hand, as climate change gradually receives attention, the people of Taiwan have placed greater emphasis on environmental protection and cultural issues in hopes that humanity could coexist with nature. We even went as far to suggest that in the future transportation projects could preserve history or incorporate aesthetics into their designs, becoming public cultural assets or works of art.

In addition, the information and communication technology (ICT) industry also has grown at a rapid pace. The

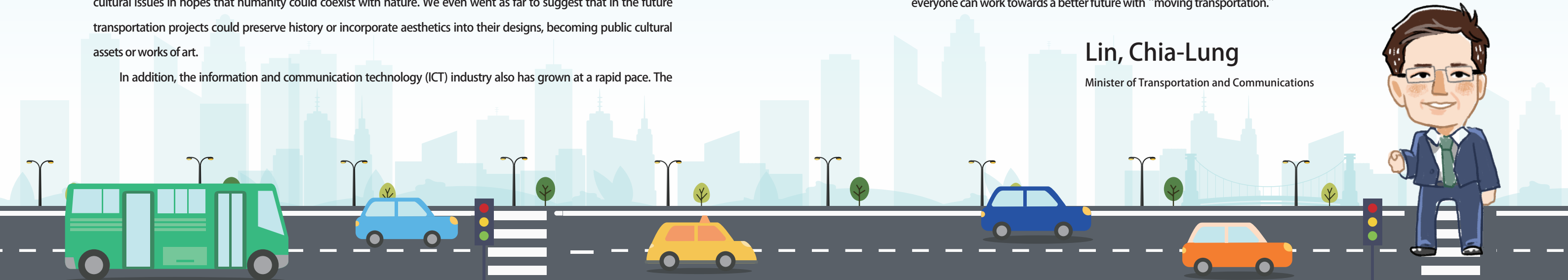
application of innovative technology such as big data, unmanned aircraft systems (UAS), self-driving cars, IoT, AI, and 5G are all impacting and changing the way people use transportation and communication, and provide a whole new set of challenges for the transportation industry and related regulations.

In order to address the changes brought on by various external circumstances, we decided to return to the roots of transportation and set out with a focus on the human side of the issue. We chose to look at transportation as the largest service industry and set a vision of the people, for the people and to form the mutually-beneficial administration-civilians relations between the MOTC and the public. Safety, efficiency, quality, and eco-green are the four core elements of the administration.

The MOTC covers a wide variety of operations, and includes a myriad of units and businesses under its jurisdiction. The *Transportation Policy White Paper* is a necessity born of the need to outline a future administration vision and to set guidance policies. It has been six years since the last white paper was published and the transportation environment has undergone drastic changes since then. As a result, the content of the white paper has been completely updated. At the same time, in order to make transportation policies more accessible to the general public, the Ministry came out with the abridged *Koinonia: A Moving Form of Transportation - 2020 Transportation Policy White Paper* in hopes that everyone can work towards a better future with “moving transportation.”

Lin, Chia-Lung

Minister of Transportation and Communications



How was the *Koinonia: A Moving Form of Transportation – 2020 Transportation Policy White Paper Completed?*

The *2020 Transportation Policy White Paper* was drafted and edited by the Institute of Transportation, MOTC. The drafting process included both top-down guidance and bottom-up steps.

The complete *2020 Transportation Policy White Paper* includes seven different volumes ranging from land transportation, sea transportation, air transportation, transportation safety, intelligent transportation, green transportation, to climate change adaptation and disaster prevention.

The seven volumes were then summarized into one summary volume. Different from the seven volumes, the summary volume is divided into eight units – international, intercity, urban, offshore island and rural, safety, intelligent, green, and adaptation to climate change and disaster prevention. Twenty-seven proposed policies and 107 drafted strategies for implementation clearly outline a precise administration blueprint.

During the process of drafting the white paper, experts from different industries, the government, academia, research institutes, ministries and agencies, and transportation administration authorities from 22 counties and cities

participated in discussions. Then through several rounds of discussion among the deputy transportation minister and other senior officers of units within the various transportation departments and affiliated organizations, the final draft was born.

The *Koinonia: A Moving Form of Transportation – 2020 Transportation Policy White Paper* is the abridged and refined version of the summary volume. To make it easier for the reader to understand the *2020 Transportation Policy White Paper*, the sprawling and complex transportation policies are generalized into eight major goals: strengthening transportation safety system; building comprehensive adaptation and disaster prevention; enhancing transportation efficacy; bolstering transportation industry development; implementing human-oriented transportation; supporting tourism development; advocating intelligent transportation; and pursuing global green trends.

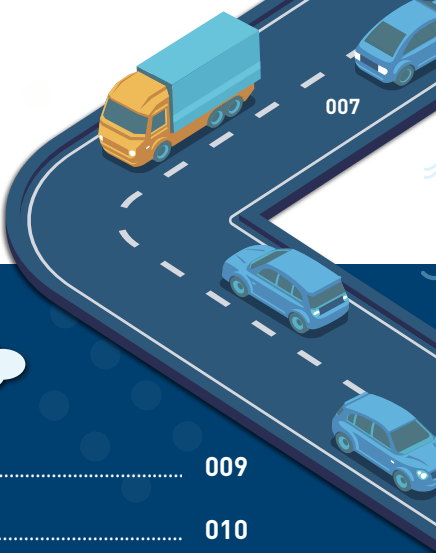
If you wish to better understand certain specific content after reading *Koinonia: A Moving Form of Transportation*, you could do some further reading with the *2020 Transportation Policy White Paper*. The Institute of Transportation, MOTC is grateful to all that chose to read this white paper and is open to any suggestions and comments.

Lin, Chi-Kuo

Director-general, Institute of Transportation, MOTC



Table of Contents



I. One Vision, Four Core Elements				008
II. A Comprehensive Blueprint				010
III. The Eight Development Goals				015
3.1 Strengthening Transportation Safety System 018	3.2 Building Comprehensive Adaptation and Disaster Prevention 034	3.3 Enhancing Transportation Efficacy 050	3.4 Bolstering Transportation Industry Development 068	
3.5 Implementing Human-Oriented Transportation 084	3.6 Supporting Tourism Development 098	3.7 Advocating Intelligent Transportation 110	3.8 Pursuing Global Green Trends 124	
IV. Meticulous Process of Feasible Policies				140
Appendix. Policies and Strategies By Sections				146

Figure 1	Vision and Core Elements of the 2020 Transportation Policy White Paper.....	009
Figure 2	Composition of the Transportation Policy White Paper.....	010
Figure 3	Vision, Core Elements, and Policies of the 2020 Transportation Policy White Paper	012
Figure 4	The Eight Goals of the 2020 Transportation Policy White Paper.....	016
Figure 5	Strategies to Achieve the Goal of Strengthening Transportation Safety System.....	032
Figure 6	Strategies to Achieve the Goal of Building Comprehensive Adaptation and Disaster Prevention....	048
Figure 7	Strategies to Achieve the Goal of Enhancing Transportation Efficacy.....	066
Figure 8	Strategies to Achieve the Goal of Bolstering Transportation Industry Development	082
Figure 9	Strategies to Achieve the Goal of Implementing Human-Oriented Transportation	096
Figure 10	Strategies to Achieve the Goal of Supporting Tourism Development	108
Figure 11	Strategies to Achieve the Goal of Advocating Intelligent Transportation	122
Figure 12	Strategies to Achieve the Goal of Pursuing Global Green Trends.....	138
Figure 13	Top-down Policy Formulation Approach.....	140
Figure 14	Bottom-up Policy Formulation Approach	141
Table 1	Sample Course of Action.....	144

I. One Vision, Four Core Elements



MOTC stands for the Ministry of Transportation and Communications. As seen in the name, in addition to efficiency, quality and safe transportation, the Ministry also takes on the mantle of managing the interactions and communications between people. In ancient Greek, transportation and moving were the same word “Koinonia.” This is more than a coincidence, but a symbol of how human beings can form the mutually-beneficial administration-civilians relations between the MOTC and the public.

The MOTC encompasses a wide range of operations and its units include the public construction and infrastructure of land transportation, sea transportation, air transportation, railway and highway systems, ICT, postal services, weather, and tourism. Each and every one of them is correlated with

people’s daily activities and is one of the fundamentals of national development. To outline the vision and formulate the guidelines for the government, the MOTC has released three editions of the Transportation Policy White Paper respectively in 1995, 2002, and 2013. It has been six years since the last edition was published. In recent years, the society has changed at a fast pace. Taiwan has become an aged society and faces challenges such as low birth rates. On the other hand, due to climate change, Taiwanese people have put more emphasis on environmental protection and cultural issues, pursuing harmony between people and nature. As for transportation infrastructure, the Ministry aspires to include the historical memories and aesthetics into the design and help the infrastructure become cultural heritage

or artwork.

In addition, due to the advancement in the ICT industry, the application of innovative technologies including big data, drones, self-driving cars, IoT, AI, and 5G, is changing the way people use transportation and communication, bringing a whole new spectrum of impacts and challenges to the transportation industry and related policies. From highway transport, railway transport, maritime transport, air transport, to even postal services and telecommunications, all means the aim to facilitate the communications between people so they can feel the connections they have with others. In response to the changes and shifts in the world, the priority is to settle down and return to the basics of transportation. By thinking from human-oriented perspectives, the values of construction and services can be seen. In this fast-paced society, the Ministry can find its own position and help citizens improve their quality of life.

Therefore, by following the goals of “diligence, connect-to-people, and practical” set by the Executive Yuan, the *2020 Transportation Policy White Paper* by the

MOTC outlines “of the people, for the people” as its vision and “safety, efficiency, quality, and eco-green” as the four core elements. (Please refer to Figure 1.)

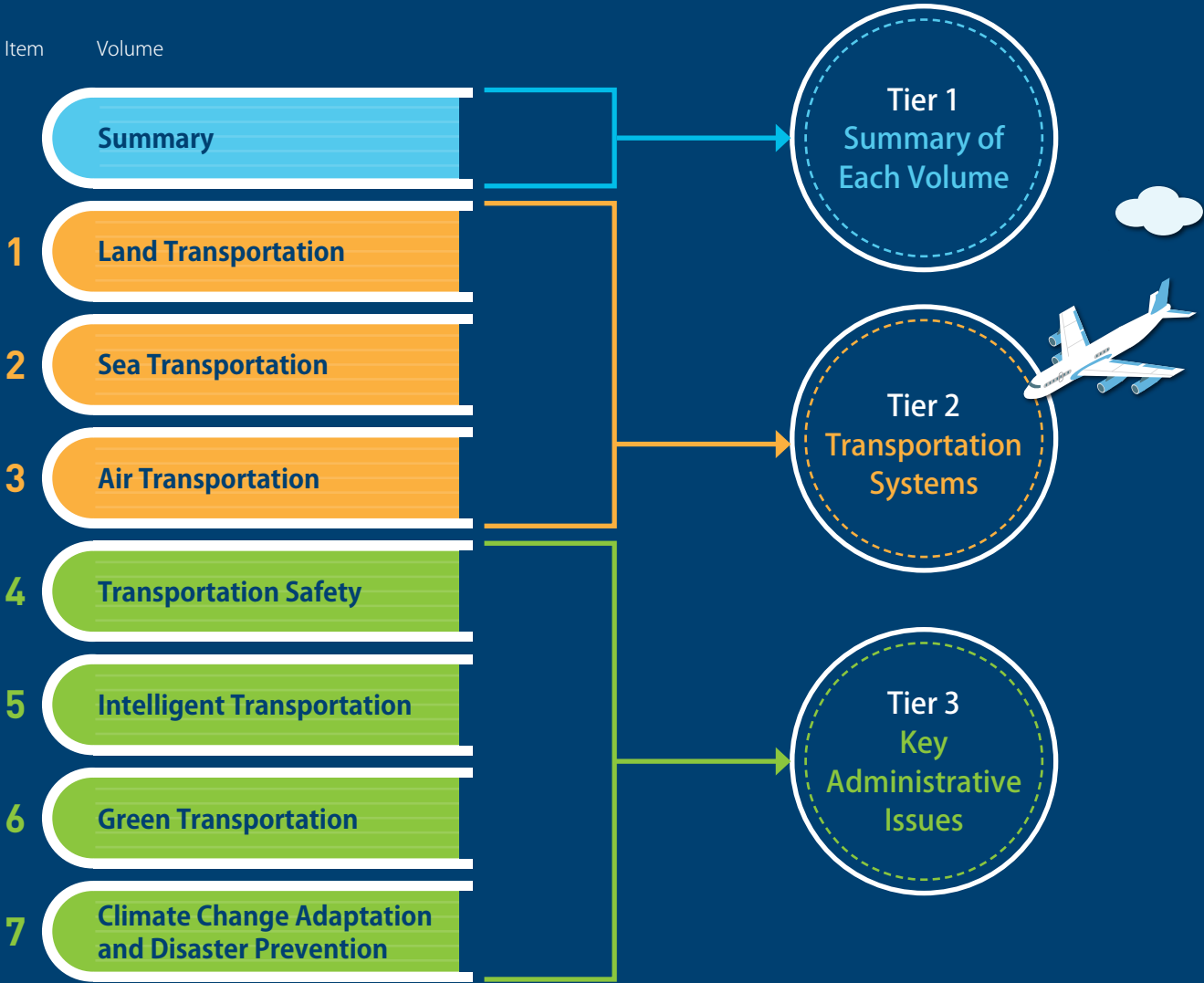
Figure 1
Vision and Core Elements of the 2020 Transportation Policy White Paper



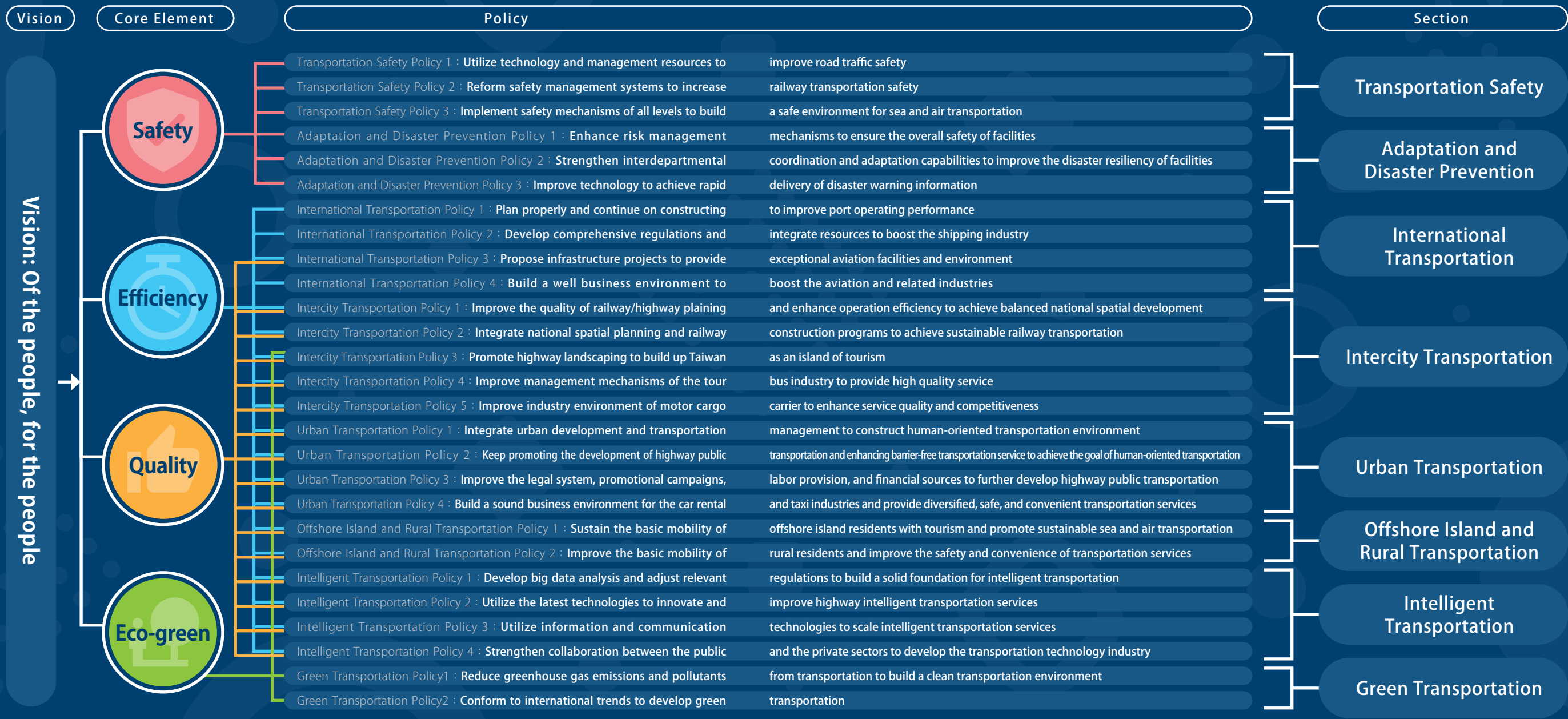
II. A Comprehensive Blueprint

The 2020 *Transportation Policy White Paper* consists of a summary and seven categorized volumes: land transportation, sea transportation, air transportation, transportation safety, intelligent transportation, green transportation, and climate change adaptation and disaster prevention, as shown in Figure 2. Each volume is comprised of three chapters: background, issues, and prospects. Starting from changes in the international and domestic transportation, key issues are then identified to introduce corresponding policies, strategies, and courses of action.

Figure 2 Composition of the Transportation Policy White Paper



The Summary summarizes essences from each volume and consists of eight sections: international, intercity, urban, offshore island and rural, safety, intelligent, and green transportation as well as adaptation and disaster prevention. Based on key issues identified, the vision of the people, for the people, and the four core elements, 27 policies (as shown in Figure 3) and 107 corresponding strategies (refer to the appendix) are formulated to shape a comprehensive blueprint of the transportation department.

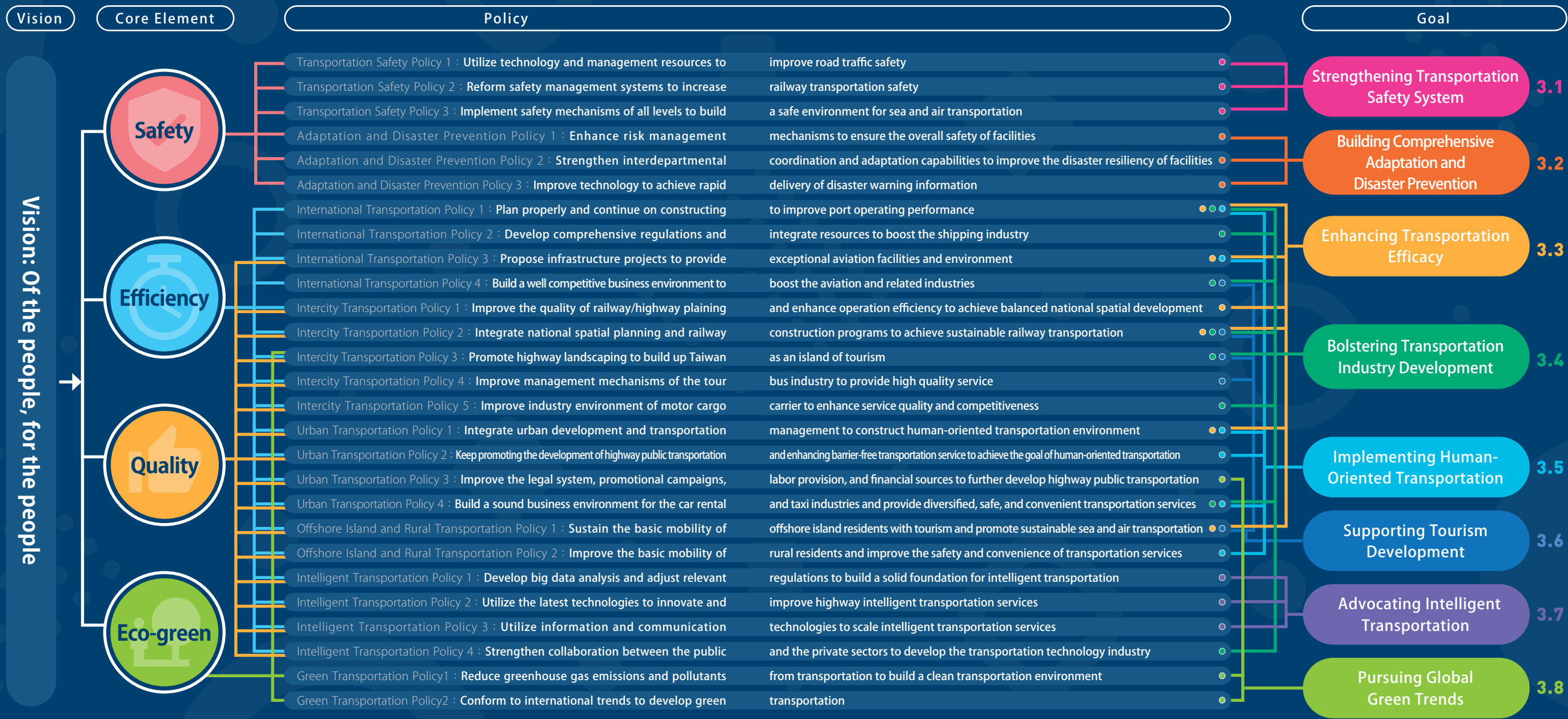




III.

The Eight Development Goals

To help readers quickly grasp the highlights of the 2020 Transportation Policy White Paper, major differences from the previous edition (2013) are selected to emphasize new concepts in the new white paper. The 27 policies and 107 strategies proposed in the summary are further consolidated in this publication into the following sections: strengthening transportation safety system, building comprehensive adaptation and disaster prevention, enhancing transportation efficacy, bolstering transportation industry development, implementing human-oriented transportation, supporting tourism development, advocating intelligent transportation, and pursuing global green trends. These eight sections constitute the eight development goals to achieve in the 2020 Transportation Policy White Paper, as shown in Figure 4. The following chapter will provide detailed glances into each goal.



3.1



Strengthening Transportation Safety System

Strengthening Transportation Safety System

Traffic Safety Lecture



Issue Tighten and reform road traffic safety regulations and systems, legislate the organizations, programs and budgets



Strategies

- Push for reform in road traffic safety regulations and systems
- Strengthen safety management and implement risk management
- Facilitate social communication with data science and technology
- Introduce innovative technology to prevent traffic accidents



Issue Push the aviation industry to implement a safety management system (SMS) and establish comprehensive unmanned aircraft systems (UAS) regulations in aviation safety



Strategies

- Supervise aviation industries to implement SMS in line with international standards
- Establish the mechanism of unmanned aircraft system (UAS) safety management system

Improve
Safety
International

Transportation
with
Standards



Issue Reform railway safety regulations and systems, and enhance data management and intelligent analysis



Strategies

- Reform railway safety regulations and systems
- Require rail companies to establish a complete safety management system
- Build and manage a big data platform for intelligent analysis



Issue Integrate maritime safety resources from various aspects to strengthen safety management mechanism, as well as complete the regulations of maritime safety and environmental protection



Strategies

- Develop intelligent maritime safety services and enhance harbor safety management
- Comply with international conventions to tighten regulations and systems on maritime safety

Transportation safety has been the most valued section in former white papers on transportation policies, and the *2020 Transportation Policy White Paper* is no exception. What separates the latest white paper from older versions is emphasizing comprehensive transportation safety systems rather than safety improvement cases.

This section covers key issues concerning strengthening transportation safety system and corresponding policies and strategies formulated in the *2020 Transportation Policy White Paper*.

1. Key Issues

Current key issues concerning strengthening transportation safety system are as follows:

(1) In order to magnify the educational and deterrence effects of road safety regulations, it is necessary to push for reform in road traffic safety regulations and systems

The Road Traffic Management and Penalty Act, which came into force in 1968, is the main law on road traffic safety in Taiwan. However, the act was designed for punishing illegal driving behavior instead of teaching road users about adequate behavior. Consequently, the act misses the mark when it comes to educational functions and behavioral obligations.

In addition, current road traffic safety regulations lack effective management of drivers’ illegal behavior. For example, the penalty points record system against violators is too mild to deter and hinder misbehavior on roads. To sum things up, road traffic safety regulations need reforming. The new legal system should focus on how to teach road users about rights and obligations

on road, correct misbehavior, and substitute punishment with education.

(2) To enhance command and coordination mechanisms, road traffic safety organizations should be raised to the Executive Yuan’s level and push for the legislation of national road traffic safety programs and budgets

The Road Traffic Safety Committee, established by the MOTC, shoulders the responsibility for holding regular meetings to coordinate ministries under the central government and supervise local government to improve road safety. Currently, most local governments have established a transportation bureau/department. The mayor or county magistrate serves as the chairperson of local Road Traffic Safety Committee, which supervising road traffic safety tasks.

A brief review on the operations of the Road Traffic Safety Committee reveals that it has no command over interdepartmental coordination and local governments. As a result, interdepartmental coordination and supervision is restricted. Moreover, budgets for improving road traffic safety infrastructure has been decreasing

annually, slowing down the pace of progress.

Governmental organization transformation has just taken place in Taiwan. To seize the moment, it is crucial to review road traffic safety systems. The central road traffic safety organizations should be raised to the Executive Yuan’s level and given greater authority and more stable financial support. Furthermore, the legislation of programs and budgets must be upheld from the central to local governments; for the time being, extra human and financial resources should be invested to overcome difficulties that emerge when attempting to reduce the number of traffic casualties.

(3) Recently, high-risk accidents such as train derailment have been happening frequently. Railway safety supervision and the self-management of operating agencies should be strengthened

The Taiwan Railway Administration (TRA) Puyuma express train derailment on October



21st 2018 caused serious casualties and led to the establishment of the Taiwan Transportation Safety Board, which independently investigates major railway accidents. Even so, characteristics of accidents and the crux of problems should be identified in the future to better formulate precautionary strategies in railway safety supervision and companies’ self-management.

(4) To fulfill proactive and precautionary improvements, it is indispensable to reform railway safety related regulations and systems

In 2018, the Executive Yuan published a comprehensive inspection report, which suggested that the TRA should foster a culture of safety and awareness, and establish SMS and carry out change management. Railway industries around the globe have been introducing SMS. Due to the lack of general regulations in the Rail Act and Mass Rapid Transit Act, and the lack of change management and corresponding requirements for the most in need of technology, railway safety management regulations and supervision systems must be updated to stay abreast with the times once more.

Founded in June 2018, the Railway Bureau can take reference from the Civil Aeronautics Administration with regard to building a safety management mechanism. For example, drafting the State Safety Program (SSP), introducing SMS to domestic railway industries, specifying authority and responsibility of supervision and operation organs, improving the clarity of existing law systematically, providing available SMS structure for Taiwan, developing operational guidelines and checklists, establishing safety assurance mechanisms for railway organizations, and to provide an inventory for railway agencies are all to cultivate a reliable safety culture.

(5) To enhance data management, it is necessary to integrate railway safety and maintenance data for intelligent analysis and management

Having neither introduced Maintenance Management Information System (MMIS), nor digitized and quantified existing data, the TRA has been unable to maintain system availability and reliability. In recent years, factors resulting in equipment malfunction were complex. However, after inspecting strategies proposed by the TRA,

problems including failing to integrate railway safety and maintenance data and lacking the ability to see the bigger picture still exist.

The MOTC has instructed the TRA to introduce advanced status-monitoring devices when implementing the “TRA Electrical Engineering intelligence upgrade program” in the Forward-looking Infrastructure Development Program. The comprehensive inspection report on the TRA also indicated that an automatic system combining data monitoring and collection has not yet been established, nor has the TRA decided what device to adopt and where to deploy them first. What’s more, individual subsystems under the TRA still await integration.

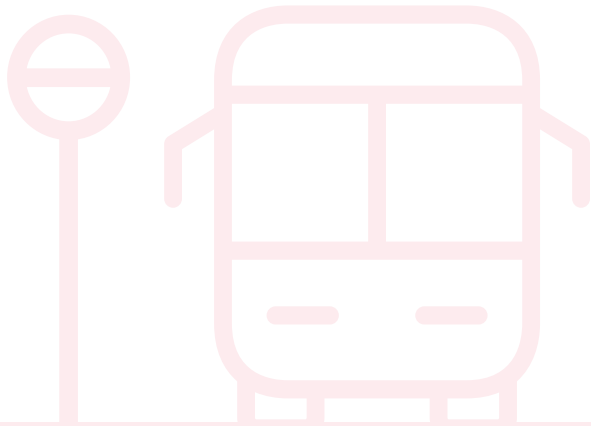
(6) To improve maritime safety, the resources from various aspects should be integrated

To improve performance on vessel early warning & alert systems and marine salvage, the authorities concerned ought to integrate vessel administration, maritime affairs, etc. and strengthen inspection, system and management of harbor facilities and vessels’ safety. By providing intelligent and integrated

maritime safety services, maritime safety is therefore assured through effective operations, systematic monitoring, as well as adequate rescue capacity.

(7) To comply with international conventions, maritime safety and environmental protection acts should be completed

To ensure maritime safety and prevent pollution caused by vessels, Taiwan should abide by the latest amendments of international conventions, continue reviewing the domestic and relative regulations, and not forget to keep an eye on issues raised by the International Maritime Organization (IMO).



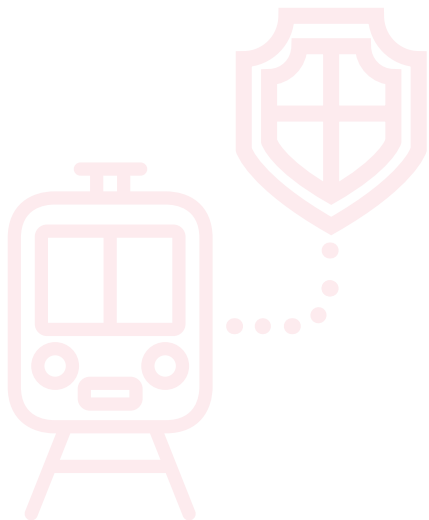
(8) To bring flight safety in line with international standards, SMS should be implemented by existing operators and further expanded to the entire aviation industry

The ICAO formulated the Global Aviation Safety Plan (GASP), which requires its members to build an effective oversight system by 2017. Moreover, the mid-term goal demands members to implement a State Safety Program (SSP) before 2022 while the long-term target aims to establish a supervision mechanism capable of risk forecasting by 2028.

To bring aviation safety in line with international standards, Taiwan ought to improve safety management at all levels. Apart from amendments on regulations concerned, it is imperative to require national airlines, maintenance service providers, manufacturers, air navigation services and airports to implement an SMS of their own. Through inspection and review of indicators on safety performance, the goals set by the SSP must be interconnected and be able to evaluate the effectiveness of the safety plans. This way, the SMS owned by aviation service providers could be proactive and precautionary.

(9) In response to the thriving unmanned aircraft systems (UAS) industry, it is necessary to find a balance between industry development and safety management

To manage unmanned aircraft systems (UAS) activities, the CAA, MOTC has completed amendments to the Civil Aviation Act, to which a chapter on unmanned aircraft systems (UAS) was added. However, more supporting measures and improvements need to be introduced to enhance management, ensure flight safety, and reduce illegal activities, as well as to promote industry development, create maximal business opportunities and production value, and maintain the safety of life and property.



2.Policies and Strategies

Refer to Figure 5 for policies and strategies regarding strengthening transportation safety system. Details of each item are as follows:

(1) Push for reform in road traffic safety regulations and systems (Transportation Safety Policy 1-Strategy 1)

This strategy emphasizes introducing the “Road Traffic Act”, which is competent in both education and rehabilitation of road users’ behavior. It is expected to produce positive outcomes of road users’ behavior. To teach road users understanding and obeying laws, it is expected to produce positive outcomes by legislation, encouragement and rehabilitation. Furthermore, punishments against severe violations such as drunken driving and excessive speeding should become stricter, and driving history management and retraining programs for violators ought to be enhanced as well. In this case, the ultimate goal is to re-educate violators by correcting both their way of thinking and behavior. In addition, extra human and financial resources should be invested to overcome difficulties in improving

road traffic safety and promoting national road safety programs to make significant achievements.

(2) Strengthen safety management and implement risk management (Transportation Safety Policy 1-Strategy 2)

This strategy emphasizes completing regulations on driver’s licenses that combine training, examination, and driver oversight. Furthermore, carrying out elderly drivers’ license management, introducing safer and more stable three-wheeler or miniaturized vehicles, and promoting more protective gear for scooter riders are all feasible measures for vulnerable road users. For automobile transportation enterprises, strengthening governmental supervision and encouraging operators to implement road traffic safety management system (e.g. ISO 39001) are desirable options. Additionally, speed management and traffic calming zones should be implemented.

(3) Facilitate social communication through data science (Transportation Safety Policy 1- Strategy 3)

This strategy aims at enacting relevant regulations and connecting databases including

road traffic accident data from NPA of the MOI, causes of death and healthcare database from MOHW, driving violation records from MVDIS of MOTC, insurance records from FSC, and academic records from the MOE to build an interdisciplinary analysis platform.

On the other hand, it is also essential to assure quality safety data, refine the casualty data classification system, gather traffic volume and exposure data, and improve research efforts in risk analysis, human factor safety, and beneficial assessment. Moreover, integrating indicators for road traffic safety, geographic information, and in-depth analysis of localized characteristics is vital to propose corresponding action plans. Disclosing road traffic safety performance regularly can encourage all city mayors and county governors to take road safety issues more seriously. What’s



more, cooperating with multiple parties, such as the press, NGOs, and volunteer groups, and taking advantage of road traffic information platform and “168 Road Traffic Safety” portal site to facilitate communication and marketing are effective at policy advocacy.

(4) Introduce innovative technology to prevent traffic accidents (Transportation Safety Policy 1- Strategy 4)

This strategy attempts to loosen existing regulation applied in innovative technology enforcement to reduce major traffic hazards, avoid police casualties, and bring sustainable equality. In terms of accident prevention, innovative technology applied to training programs, driver-assistance systems, road environment risk, etc. can accomplish the task successfully.

(5) Reform railway safety regulations and systems (Transportation Safety Policy 2- Strategy 1)

This strategy concentrates on amending railway and MRT concerned regulations on safety to guarantee railway transport system stays on track. Further steps are to establish SMS and a unified

interpretation of what the legislations demand and how to meet them. Other actions range from enacting state railway safety programs, strengthening supervision, cooperating with foreign safety organizations, supporting domestic industries in railway safety, cultivating a culture of safety awareness, and running dedicated departments responsible for safety in railway operators.

(6) Overhaul the entire railway SMS (Transportation Safety Policy 2- Strategy 2)

This strategy tries to demand railway operators to establish SMS that conform to international standards and to establish a dedicated office for safety and hazard control. Railway operators should design a regular internal audit system to examine daily operations and prevent SMS from being too formalized. Supervision units can conduct routine checks and publish reports on safety management to ensure SMS to run properly. Also, defects could be identified step by step and corrective actions taken early to secure SMS implementation and raise safety awareness with every employee. Last but not least, the ability to execute emergency responses of railway

SMS should be developed in stations where multiple railway systems converge, such as the Taipei Main Station.

(7) Apply intelligent technologies in railway safety (Transportation Safety Policy 2- Strategy 4)

This strategy engages in innovative applications (e.g. internet of things, big data, and artificial intelligence) that realize system integration in communication and signal, train safety control systems, telematics for carriage safety, and intelligent railway stations. Beyond that it aims to bring in an intelligent safety management system and conduct a rolling review on the Six-Year Railway Safety Improvement Plan. Nevertheless, it is of urgent need to enact applicable laws allowing advanced railway facilities, verify procedures, and run pilot programs to prevent vehicle-train collisions on level crossings of railroads and roads.

(8) Develop intelligent maritime safety services and enhance harbor safety management (Transportation Safety Policy 3-Strategy 1)

This strategy focuses on planning the intelligent

maritime safety construction and management, as well as enhances the safety services and management in the harbors. Through building infrastructures such as navigation facilities, coast radio, maritime center and so on, it provides an integrated platform for intelligent maritime safety services, enforces port state control (PSC) required by the IMO, and strengthens flag state control and passenger ship safety management. As for ports, it strengthens the maintenance service on infrastructure assets including harbor structures, roads, bridges, etc. to offer safe and reliable port services.

(9) Tighten regulations and systems on maritime safety (Transportation Safety Policy 3- Strategy 2)

Regulations and systems are the cornerstone of maritime safety. This strategy takes up continuous reviewing of relevant laws and regulations to establish maritime safety in a sound system.

(10)Implement aviation SMS at all levels of the aviation industry persistently (Transportation Safety Policy 3- Strategy 4)

Even though the air navigation service units,

airports, civil aviation carriers, maintenance service providers, and aircraft manufacturers have set up SMS according to regulations, it is pivotal to catch up with international regulations and evaluate the performance of SMS to ensure the safety of aviation services.

(11) Establish the mechanism of unmanned aircraft system (UAS) safety management system (Transportation Safety Policy 3- Strategy 7)

As the unmanned aircraft system (UAS) industry is increasingly thriving, to ensure the safety of airspace, this strategy focuses on the amendment of the related laws, regulations and management mechanisms, and the public propaganda for introducing the concept of unmanned aircraft (UAS) safety so as to ensure aviation safety and orderly flight in limited airspace.



3.Major Courses of Action

Major courses of action responding to the aforementioned policies and strategies are as follows:

- ❶ Formulate the “Road Traffic Act” , legislate national road traffic safety programs and budgets;
- ❷ Introduce the Taiwan New Car Assessment Program(T-NCAP);
- ❸ Launch the programs of national road traffic safety action plan;
- ❹ Bring in technology enforcement to curb malicious severe violations;
- ❺ Facilitate social communication via the road traffic safety information platform and “168 Road Traffic Safety” portal site;
- ❻ Develop a state railway safety program and SMS applicable to railway operators;
- ❼ Implement the Suhua Highway Safety Improvement Project;
- ❽ Push SMS appropriate for domestic shipping services;
- ❾ Build a maritime center and promote intelligent maritime safety;
- ❿ Complete and enforce relevant regulations and management systems for unmanned aircraft systems (UAS);
- ⓫ Enhance maintenance and management on infrastructure assets including harbor structures, roads, bridges, etc.

Figure 5 Strategies to Achieve the Goal of strengthening transportation safety system

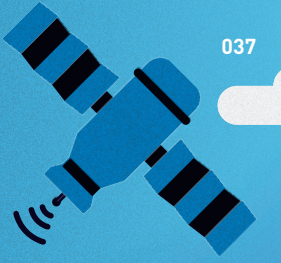


3.2



Building Comprehensive Adaptation and Disaster Prevention

Building Comprehensive Adaptation and Disaster Prevention



! Issue Strengthen risk management

💡 Strategies

- Establish or refine the safety and risk assessment method of transportation facilities and conduct routine assessments
- Strengthen disaster reconnaissance mechanisms and responses
- Take into account the surrounding environment when developing transportation facility projects and seek to avoid potentially high-risk areas

! Issue To evaluate and adjust pre-disaster preparations

💡 Strategies

- Strengthen and conduct a rolling review of current pre-disaster preparations

! Issue Reinforce interdepartmental coordination and joint building comprehensive adaptation and disaster prevention strategies:

💡 Strategies

- Build a comprehensive integrated cross-functional communication mechanism on adaption to climate change
- Establish a back-up plan for transportation facilities after consultation and deliberation
- Strengthen intermodal transportation systems interfaces and impact resistance of critical infrastructures' access or connecting roads

! Issue Utilize technology to upgrade equipment, techniques, and the dissemination of information

💡 Strategies

- Improve the disaster prevention early warning system and its technology
- Use technology to strengthen the inspection and monitoring of transportation facilities
- Research, develop, and apply materials, equipment, and construction methods that are beneficial to increasing impact resistance

Climate change brought on by global warming is a major issue that all countries have to face and adapt to. In light of these changes, the *2020 Transportation Policy White Paper* is different from previous versions, in that it contains a section in regards to adapting to climate change and disaster prevention. This section covers key issues concerning adapting to climate change and disaster prevention and corresponding policies and strategies formulated in the 2020 White Paper.

1. Key Issues

Current key issues concerning building comprehensive adaptation and disaster prevention are as follows:

(1) Risk management mechanisms should be strengthened in response to the increase in possibility of large scale and compound disasters

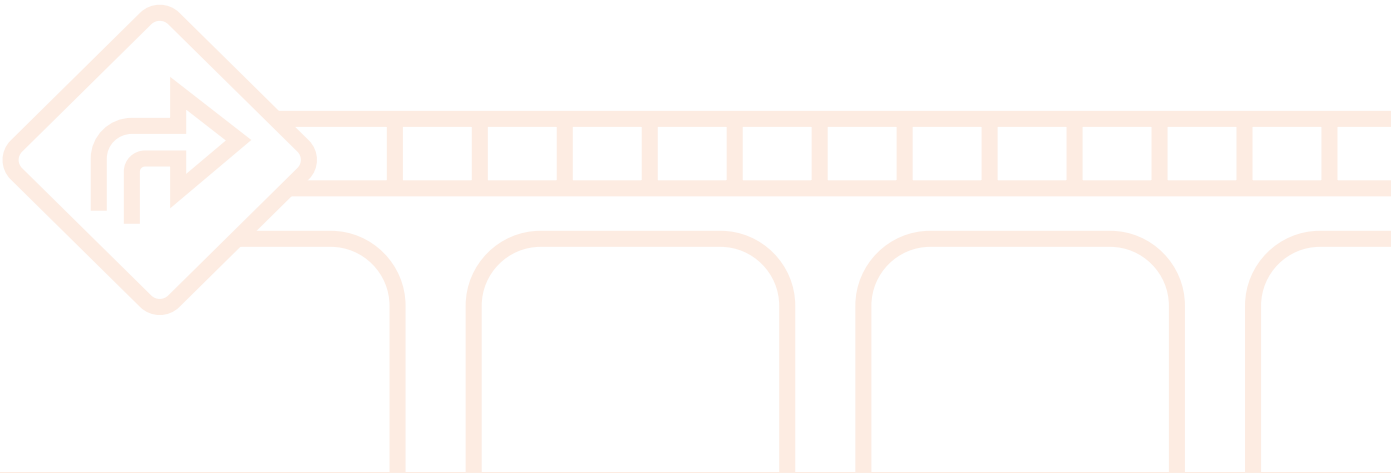
Risk management can be broadly divided into two phases, risk assessment and managing risk. Risk assessment is an important aspect of risk management, by not only painting a clearer picture of the uncertainty when disaster strikes, but also aids managers in assigning priority to different areas when setting a course of action. Furthermore, transportation departments should establish related standard operating procedure. Taking bridge maintenance and management as an example, the inspection and reinforcing of bridges should be done according to regulations, and the supervision of bridge management should be kept up to date on a rolling review basis.

(2) Pre-disaster preparations should be evaluated and adjusted in response to the impacts of climate change

Transportation departments taking pre-disaster preventive measures is something that has been happening for years, but when faced with more unpredictable and powerful disasters brought on by climate change, the previous preventive measures might fall short. Pre-disaster preparations should be done in response to the impacts of climate change. For instance, strengthening preparations, public notifications, and early warning systems in disaster-prone areas and also monitoring, adjusting, and responding when disaster strikes.

(3) Interdepartmental coordination and joint disaster prevention abilities need to be strengthened in response to the increase in probability of compound disasters occurring

The chances of compound disasters occurring have been increased due to extreme weather brought on by climate change. Cross-departmental disaster prevention now relies even more heavily on the cooperation and joint discussion of government authorities of all levels and local governments. Most countries prioritize and place great importance on consensus building between the public and private sectors and stakeholders. By joining efforts and integrating resources, adaptation programmes can



be effectively implemented, increasing their overall effectiveness. Based on this, the question of how to coordinate interdepartmental and cross-departmental cooperation and how to build a strong consensus and integration of resources will become a major issue in increasing the overall ability to adapt to and prevent disasters.

(4) Technical applications and the dissemination of disaster prevention information should be improved in order to increase the effectiveness of the disaster prevention early warning system and monitoring abilities

Potential losses to transportation facilities from the impact of extreme weather instances are correlated to the duration of effects and the ability to recover, but are also closely tied to the provision of precise early warning information allowing related departments and people using the facilities ample time to take preventive measures. Especially in an environment with climate change, instances of torrential rain and severe tropical typhoon are becoming more frequent. It thus becomes even more imperative for precise and

timely early warning information to act as a barrier for the unforeseen and to reduce the impact on our daily lives.

(5) Equipment and technologies should be updated and improved by technology in response to the increase in severity of extreme climate disasters

In response to climate change and extreme weather, the transportation system should reassess its ability to withstand disasters and introduce new equipment and technology when needed to increase their disaster preparation ability. To increase

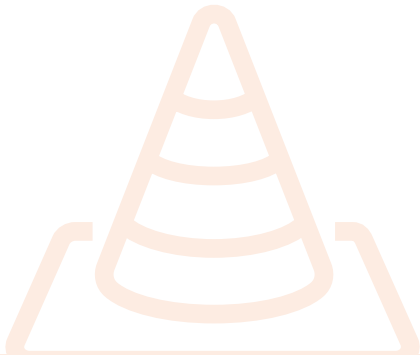
the resistance of facilities to impacts, research and implementation of materials and equipment that have a stronger impact resistance should be completed. For instance, pavement that is resistant to high temperatures. In addition, new technologies and tools should be continuously introduced in order to improve the efficiency of disaster damage assessment, reconstruction, and lessen the burden on the need for human labor. Apart from new purchases, original equipment should undergo proper maintenance throughout its life cycle and be replaced if deemed no longer serviceable.

2.Policies and Strategies

Refer to Figure 6 for policies and strategies regarding building comprehensive adaptation and disaster prevention. Details of each item are as follows:

(1) Establish or improve on preexisting safety and risk evaluation methods for transportation facilities with routine assessments (Adaptation and Disaster Prevention Policy 1 - Strategy 1)

When considering the mounting threats of climate change to the safety of facilities, this strategy focuses on establishing safety standards and risk assessment methods for transportation systems that are prone to being rendered unable to properly function due to adverse weather. As for transportation systems that already have a standard and method of assessment in place, they should continue improving and optimizing their methods. Furthermore, in order to prevent disasters from happening to bridges and causing loss of life and property, the strategies of improvement in maintenance and management of bridges should be implemented.



(2) Strengthen disaster reconnaissance and response mechanisms (Adaptation and Disaster Prevention Policy 1 - Strategy 2)

Disaster reconnaissance should determine information such as the scope and range of the disaster, and its impact on stakeholders, as a support tool to follow-up responses and decision

making. Disaster reconnaissance and response mechanisms should be kept up to upgrade and renewed by applying the newest technology in order to face the harsh ordeals of extreme weather brought on by climate change. This strategy focuses on the need for disaster reconnaissance methods and equipment to keep up with the times, and to be updated according to technological advances. Results of previous responses to disasters should be analyzed and rolling reviews be carried out of actions taken. In addition, discussion should take place or regulations be revised in response to changes in the surrounding environment, such as changes in land usage, filling of ponds, the deterioration of river embankments, and damage or blockages in underground drainage systems.

(3) Take into account the surrounding environment when developing transportation facility projects and seek to avoid potentially high-risk areas (Adaptation and Disaster Prevention Policy 1 - Strategy 3)

The focus of this strategy is on the selection of locations for building new transportation facilities.

Designers should actively avoid high-risk areas such as low-lying areas and geologically sensitive areas and take into consideration the surrounding environment to ensure that the facility's resistance to impacts from weather is up to par. For existing facilities situated in potentially high-risk areas that are often faced with severe disasters, and after evaluation and confirming that no amount of technology or materials can alleviate the situation, then it might be necessary to reevaluate whether routes should be changed, stops or stations be relocated, or alternative transportation be explored in order to ensure the safety and reliability of the transportation system.

(4) Strengthen and conduct a rolling review of current pre-disaster preparations (Adaptation and Disaster Prevention Policy 1 - Strategy 4)

The focus of this strategy is on the evaluation of the effects of climate change on freeways and highways and to adjust accordingly and make preparations. In addition, for disasters outside the right of way, it is not easy to improve the coordination and the division of responsibilities.

Because of this, disasters are a bit more difficult to be solved. So there should be a rolling review and constant improvement. From a railroad aspect, related disaster prevention facilities should undergo routine inspections and be renewed, repaired, and strengthened when necessary to ensure that the facilities can be counted on to do their job before the disaster. For commercial ports and airports, related countermeasures should be set in place for facilities, the environment, and possible disasters. Pre-disaster countermeasures should be strengthened beforehand in order to avoid disasters or reduce the risk of disasters.



(5) Build a comprehensive integrated cross-functional communication mechanism on adaption to climate change (Adaptation and Disaster Prevention Policy 2 - Strategy 1)

Adaptation to climate change more often than not involves different transportation facilities, and even may include cross-departmental communication and cooperation. This strategy focuses on building an integrated cross-functional communication mechanism on adaptation to climate change that can effectively coordinate the division of duties and the integration of resources across ministries and agencies.

(6) Establish a back-up plan for transportation facilities after consultation and deliberation (Adaptation and Disaster Prevention Policy 2 - Strategy 2)

To develop a response to disruption of transportation services caused by extreme weather, this strategy focuses on the establishment of back-up plans for individual transportation systems. For instance, critical piers being built in commercial ports, and alternative airports and emergency landing plans for airports. In addition, a cross-system back-up mechanism must be in place to disperse passengers and goods through different transportation systems.

(7) Strengthen intermodal transportation systems interfaces and impact resistance of critical infrastructures’ access or connecting roads (Adaptation and Disaster Prevention Policy 2 - Strategy 3)

Transportation systems not only provide the capabilities to transfer passengers and goods in normal times, but are also important connecting roads for other important critical infrastructure

to receive maintenance and aid during disasters. In order to preserve the functionality of the transportation systems from an environment undergoing climate change, this strategy prioritizes the safety of access or connecting roads of critical infrastructures from inclement weather. Also, this strategy strives to ensure that cross-transportation facility interfaces are uninterrupted and won’t lead to a halt in transportation functionality and as a result interfere with maintenance and rescue efforts on other critical infrastructure.

(8) Improve the disaster prevention early warning system and its technology (Adaptation and Disaster Prevention Policy 3 - Strategy 1)

The focus of this strategy is to boost the research and application of related technology in order to improve the accuracy and speed of early warning systems for weather-related events. Another focus is to continuously expand the range of meteorological observation networks, refine the integration of meteorological satellites and radar data and developing high-resolution weather

forecasting models to increase the timeliness and accuracy of weather forecasts. Moreover, marine meteorology data can be carried out the early warning and disaster prevention application of transportation systems. Additionally, the Ministry actively strengthens and refines people’s awareness of disaster prevention and risk avoidance in accordance with a weather forecast early warning system and the existing disaster prevention plans.

(9) Use technology to strengthen the inspection and monitoring of transportation facilities (Adaptation and Disaster Prevention Policy 3 - Strategy 2)

This strategy focuses on the review and optimization of current inspection and monitoring systems. For example, establishing standards, increasing inspection and monitoring efficiency, and routinely reviewing and adjusting the location and number of monitoring equipment. Furthermore, by using technology to promptly transfer inspection and monitoring results to relevant disaster prevention personnel or stakeholders, they can rapidly understand the situation for high-risk areas and reduce the time to

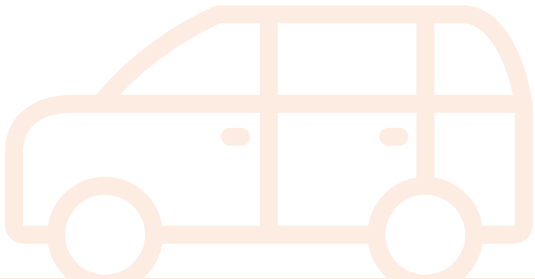


transfer information, increasing the completeness of information and efficiency.

(10) Research and develop and use of material, equipment, and technologies that improve impact resistance (Adaptation and Disaster Prevention Policy 3 - Strategy 3)

TThis strategy focuses on reassessing the disaster resistance abilities of equipment, facilities, and technology of transportation systems and routinely updating and introducing new equipment and technology to increase disaster prevention abilities. Current equipment and facilities are repaired, undergo maintenance, or replaced according to budgets and the importance of the

facilities. Additionally, research and development of materials, methods, or equipment can increase impact resistance. With technological research and applications, the Ministry continuously strives to increase the efficiency of disaster surveillance and recovery, as well as the exchange and transfer of new foreign technology along with the integration of technology from domestic research and development units.



3.Major Courses of Action

Major courses of action responding to the aforementioned policies and strategies are as follows:

- ① Conduct a safety assessment of railway and highway side slopes deformation;
- ② Apply AI, UAV, and remote sensing technologies in the inspection and monitoring of railways and highways;
- ③ Establish an intelligent highway monitoring and disaster prevention decision support system;
- ④ Conduct the strategies of improvement in maintenance and management of bridges;
- ⑤ Build a comprehensive railway facilities information management system;
- ⑥ Apply intelligent marine meteorology to disaster prevention early warning system of sea, air, railway and highway transportation;
- ⑦ Conduct an early warning mechanism for anchorage grounds of all harbors in the event of a typhoon or tropical depression;
- ⑧ Conduct planning and evaluation of critical harbors.

Figure 6 Strategies to Achieve the Goal of Building Comprehensive Adaptation and Disaster Prevention



3.3



**Enhancing
Transportation
Efficacy**

Enhancing Transportation Efficacy

Issue Effectively utilize national resources to meet the needs of long-term transportation development

- Strategies**
- Enhance comprehensive transportation planning and review mechanisms
 - Formulate comprehensive regional transportation planning and push for the construction of highway and railway networks

Issue Increase operational efficiency of highway and railway networks

- Strategies**
- Propose comprehensive development plans for freeway and expressway systems and a high-efficiency island-round railway network

Issue Build an international aviation hub

- Strategies**
- Implement core construction projects for Taoyuan International Airport

Issue Early highway and railway systems are facing the aging of facility and the pressure of upholding and upgrading, which should reinforce the maintenance and reinforcement

- Strategies**
- Increase maintenance, repair, and reinforcement reliability for highways and railways

Issue Complete railway system development and optimize integrated shuttle services

- Strategies**
- Introduce transit-oriented development (TOD) to integrate national spatial development and railway transport services

Issue Address competition from international ports and increasing sea passenger transport demand

- Strategies**
- Improve port infrastructure and strengthen operational partnerships

Issue Achieve sustainable sea transport development for Taiwan's offshore islands

- Strategies**
- Improve port infrastructure and maritime transport route planning for offshore islands

Major transportation projects are characterized by long construction periods, vast expenses, and far-reaching social and economic impacts. Therefore, an overall assessment has to be conducted in the planning stage from the perspective of the long-term development of the country and the city. Bearing this in mind, it is the utmost important task of MOTC to enhance the efficacy of national transportation systems through integrated planning. In addition, it is also important to ensure that major land, maritime, and air transportation constructions are completed in accordance with the schedules and standards formulated, missing links between networks are bridged, and connected transportation of major nodes are enhanced. This section covers key issues concerning enhancing transportation efficacy and corresponding policies and strategies formulated in the 2020 White Paper.

1. Key Issues

Current key issues concerning enhancing transportation efficacy are as follows:

(1) Enhancement of road network planning and assessment mechanisms are needed to effectively utilize limited national resources and meet long-term development goals

The economic benefits of major transportation projects are difficult to compare due to differences in assessment items, methodology, duration, and parameters in each project. As a result, it is impossible to give priority to individual projects in terms of resource allocation, and comprehensive road network planning and assessment mechanisms are necessary.

(2) Increase of container traffic and ship routes is necessary to address keen competition from global ports

Due to rapid development changes in international ports worldwide and keen competition from ports of surrounding countries, China has proposed numerous incentives to boost its major

ports. Xiamen Port, a port neighboring Taiwan, has waived cargo charges and provided discounts on miscellaneous port charges for shipping enterprises unloading or transferring containers. As vessels increase in size, Kaohsiung Harbor is implementing its second phase construction project of Kaohsiung Intercontinental Container Terminal, which is expected to accommodate container ships of over 22,000 TEU. However, as the growth global cargo volume has slowed down in recent years, international ports around the world may experience excess capacity and insufficient cargo volumes. Therefore, it is urgent to take measures to balance capacity and demand to raise efficiency.

(3) Promotion of domestic maritime industry among offshore islands is required to achieve sustainable development

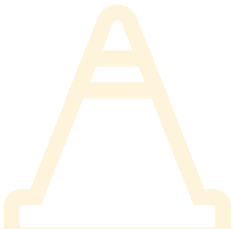
Maritime transportation in offshore islands has distinctive high and low seasons, and a majority of shipping routes rely on government subsidies to maintain operation during low season for travel (winter). However, due to scarce financial sources, it is necessary to reassess current supply and demand,



route operations, and subsidy policies of maritime transportation to and from Taiwan’s offshore islands. Furthermore, a comprehensive development strategy of offshore island maritime transportation is the key to achieve sustainable development.

(4) In response to the growing maritime passenger transport business, it is essential to upgrade port passenger services and facilities

The cruise market in Taiwan has been booming in recent years, and it is necessary to continue improving facilities in Keelung Port and Kaohsiung Port to fulfill the government’s policy to develop two cruise homeports, one in the south and one in the north. This includes improvements of facilities, spatial design, expansion of luggage storage space, and construction of the Kaohsiung Port Passenger center. The strategy will help adapt to increasing vessel cruise size and provide tourists with a cozy and convenient boarding space.



(5) Continuing construction projects to build Taoyuan International Airport as an aviation hub

As global air passenger and freight transport demand in Taiwan and the Indian-Pacific region has been increasing in recent years, the government has aimed to build Taiwan as an aviation hub. Continual constructions, airport infrastructure upgrade, and service quality improvement are necessary to accommodate and handle increasing passengers and cargo in the future.

(6) Airport development should be in line with national spatial planning, with all airports taken as one integrated system, and continuous infrastructure improvement is needed to ensure operational resilience

To avoid unnecessary competition among airports in Taiwan due to implicit positioning, which may undermine the country’s competitiveness in the global aviation market, a development mechanism incorporating national spatial planning is essential. Comprehensive assessments should be conducted based on the concepts of airport systems and industry clusters. In the face of impacts brought about by

climate change and other causes, it is necessary to further strengthen resilience of airport infrastructure to recover rapidly from disasters. Furthermore, disaster prevention should be emphasized in airport planning, maintenance, and management.

(7) To optimize the service integration of railway system, it is necessary to integrate the national spatial development with railway system, complete overall planning for railway system, and facilitate integration of railway and road transport operations

Although railway systems in Taiwan already have their own basic position, it is necessary to integrate railways in major traffic nodes to address changing socioeconomic trends and the introduction of new systems. Previously, there was a lack of comprehensive planning and policies to integrate individual railway projects, neither was there a reassessment or ex-post assessment mechanism, and the projects were therefore far from satisfactory. In addition, sustainability was often neglected when developing railway systems in metropolitan areas. Urban railway networks in the future need to be integrated with

local public transportation services. Furthermore, the TRA’s key policies of development toward rapid and grade separation works lack clear objectives of being responsible as the principal axis of urban transportation and therefore undermines the operation performance of the railways. Considering the existing challenges, railway development should be in line with national spatial planning, land development, and industry development to avoid competitions and conflicts between different systems. Meanwhile, it is necessary to properly integrate railway and highway services through transfer facilities, adjust bus routes, and improve service quality to boost public transportation ridership.



(8) Disconnects between highway systems and bottlenecks in the island-round railway system should be addressed to further increase operational efficiency

Highway networks connecting international ports and airports in Taiwan are not direct and convenient enough, and trips to/from airports and ports are often jammed with traffic around the city. This has led to extra travelling time and

costs and undermined Taiwan’s competitiveness in international transportation. Currently, there are still disconnects and bottlenecks in the highway system, including disconnected expressway networks and a lack of interchanges between freeways and expressways in several nodes. These problems have decreased the efficiency of the entire road network, and measures should be taken to relieve congestion and enhance traffic efficiency. As for bottlenecks and speed limitations in certain sections of the island-round railway system, rectifications should be made to balance regional development.

(9) Early highway and railway systems are facing the aging of facility and the pressure of upholding and upgrading, which should reinforce the maintenance and reinforcement

First undertaken in the 1970s as part of Taiwan’s Ten Major Construction Projects, the main railway and highway networks in Taiwan have long since reached maturity. However, as concrete facilities have a life cycle of 50 years, most railways and highways have gradually become outdated. Maintenance, repair, and retrofitting therefore have become the most

important issue in highway/railway management. It is necessary to improve risk management in all highway/railway facilities to avoid life and property loss of travelers.

(10) Introduction of transit-oriented development (TOD) in the planning stage is essential to prevent defective urban planning and major development projects

As road capacity limits and building bulk control have been neglected in urban development, the entire urban planning system has lost its balance. In consequence, roads connecting or surrounding cities are often congested. In addition, complementary support for major development projects are insufficient. For example, traffic of connecting roads and highways around Hsinchu Science Park is often heavy. Introduction of transit-oriented development (TOD) in transportation planning is therefore essential to build proper public transportation systems and decrease people’s reliance on private motor vehicles.

2.Policies and Strategies

Refer to Figure 7 for policies and strategies regarding enhancing transportation efficacy. Details of each item are as follows:

(1) Enhance comprehensive transportation planning and review mechanisms (Intercity Transportation Policy 1 - Strategy 2)

To maximize the benefits of MOTC subsidies to local governments and to properly follow up the progress of projects subsidized, this strategy aims to conduct rolling reviews on project assessment mechanisms, such as Directions for Application and Examination of MRT Construction and Adjacent Land Development Project, Directions for Examination of Railroad Crossing and Environment Improvement Construction and Adjacent Land Development Project, and Directions for subsidies of the Region-Based Road System Construction Project. In addition, subsidies can be utilized as a tool to guide local governments to conduct comprehensive transportation planning before construction.



(2) Improve and establish standardized assessment tools for transportation plans (Intercity Transportation Policy 1 - Strategy 3)

Budgets for transportation construction projects are often huge, and therefore it is essential to establish assessment standards and improve existing assessment tools to make good use of limited governmental resources. This strategy includes the development of the Rapid Transit Network Planning and Design Manual, the continuous revision of Taiwan Railway/Highway Capacity Manual and The Handbook for the Economic Benefit Evaluation of Transportation Projects, and the maintenance of the Taiwan Transportation Decision Support System. In addition, to build an objective, systematic, trustworthy, and easy-to-use assessment mechanism for governmental agencies in the transportation department, all relevant agencies are required to follow a standardized operation procedure. In doing so, the government will be able to conduct objective assessments of transportation projects and formulate decisions with consistent criteria.

(3) Improve port infrastructure and strengthen operational partnerships (International Transportation Policy 1 - Strategy 1)

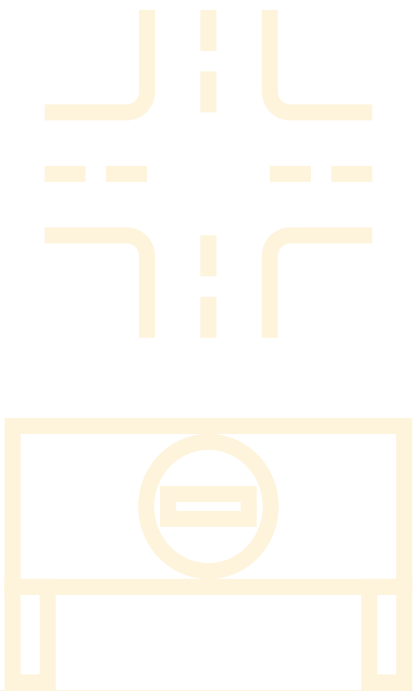
Keen competition at ports in the Asia-Pacific region, increasing vessel volume, and the alliance operation mode are challenges impacting the development of ports in Taiwan. The strategy aims to improve port facilities based on vessel berthing and cargo handling demand. In addition, incentives for marketing and the Blue Highway island-round cargo transfer project are expected to help transform port operation models.

(4) Improve port infrastructure and maritime transport route planning for offshore islands (Offshore Island and Rural Transportation Policy 1 - Strategy 2)

Maritime transport to and from offshore islands helps sustain the livelihood of local residents and renew daily necessities, and it is therefore necessary to maintain its operations. The strategy takes inventory of offshore maritime transport supply and demand, shipping route operations and subsidy patterns, develops strategies for operations and infrastructure, and aims to achieve sustainable maritime transport to and from offshore islands.

(5) Implement core construction projects for Taoyuan International Airport (International Transportation Policy 3 - Strategy 1)

To respond to the growth of international passenger and freight traffic and to develop Taiwan as an aviation hub, the Taoyuan Aerotropolis Program will be continued with Taoyuan International Airport as the core element. The major targets of this strategy include the construction of



Terminal 3 and Runway No.3 at Taoyuan International Airport as well as an increase of its capacity. Meanwhile, corporate governance models are adopted to airport management to enhance the airport’s competitive positioning and service quality.

(6) Conduct airport development plans in accordance with the position of each airport and continue to enhance operational resilience (International Transportation Policy 3 - Strategy 3)

In order to facilitate development of airports in Taiwan based on each of their position and to deal with infrastructure breakdown caused by extreme climate or disasters, it is necessary to improve airport infrastructure and maintenance systems to enhance operational resilience. This strategy emphasizes comprehensive airport planning, reasonable resource allocation, and enhancement of operational resilience, which are expected to promote the overall operational efficiency.

(7) Propose comprehensive development plans for freeway and expressway systems and a high-efficiency island-round railway network (Intercity Transportation Policy 1 - Strategy 1)

This strategy includes improvement connecting transportation systems surrounding international airports and ports. For example, connecting roads construction of National Freeway No.7 and No.1A are expected to increase national competitiveness. It also aims to build complete freeway and expressway networks to increase the efficiency of industry logistics and intercity transportation, such as the project to connect National Freeway No.5 and the Suhua Improvement Highway and the improvements of Dong’ao - Nan’ao, Heping - Hezhong, Daqinshui - Chongde sections of Provincial Highway No.9. Furthermore, the strategy includes enhancement of the “High Speed Rail in the western corridor and express rail in the eastern corridor” island-round transportation, such as High Speed Railway extension, commuter railways between Keelung and Nangang, railway speed increase of the Nangang - Hualien section, and standard-gauge railways in eastern Taiwan.

(8) Complete railway system development, management, construction, and benefit assessment mechanisms and relevant laws and regulations (Intercity Transportation Policy 2 - Strategy 3)

With the core values of pursuing sustainable operation and appropriate development of railway networks and systems based on assigned positions, this strategy aims to formulate a long-term development blueprint and guideline for sustainable development of Taiwan’s railway systems, and rolling review mechanisms with be adopted to keep up with the changing society. In addition, guidelines for transportation planning in urban areas will be formulated to build complete urban railway transportation and public transportation systems. Regular follow-up of relevant regulations will be conducted to address latest technologies, technologies, and social changes. For instance, revisions should be made to regulations and incentives on application and review of train stations and development of the adjacent land. Furthermore, to encourage investment in railway-related industries from the private sector, reviews have been made to existing regulations governing private sector investment with references to international standards, with a goal of boosting investment.

(9) Formulate comprehensive regional transportation planning and push for the construction of highway and railway networks (Intercity Transportation Policy 1 - Strategy 5)

This strategy requires local governments to propose comprehensive regional highway/railway constructions that are in line with regional development visions, public transportation planning, and transportation management strategies, etc. to conduct the the task of overall transportation planning. In particular, the ministry’s subsidy plan for “Region-Based Road System Construction Project” should take the performance of highway system planning in each city as a decisive factor. For regional railway planning, competition and cooperation among corridors and transport operators (Taiwan railways, regional railways, and existing metro systems) should be evaluated, and transfer services between public transportation such as city buses, urban rails, Taiwan Railways, and High Speed Rails should be improved. In addition, secondary transportation corridors in major cities and major corridors in secondary cities can focus on light rail transits (LRT) to respond to the central government’s development policy to foster growth of the railway industry.

(10) Increase maintenance, repair, and reinforcement reliability for highways and railways (Intercity Transportation Policy 1 - Strategy 4)

This strategy aims to improve the maintenance and reinforcement mechanism for railway/highway systems by conducting regular inspections and management plans for existing facilities, taking appropriate measures to repair or replace the facilities, and implementing preventive management strategies, such as earthquake-proof projects for railways, highways, and bridges, retrofitting of old buildings and public facilities. These help maintain the function and performance of highway/railway systems.



(11)Introduce transit-oriented development (TOD) to integrate national spatial development and railway transport services (Intercity Transportation Policy 2 - Strategy 1)

This strategy aims to introduce transit-oriented development (TOD) to railway transportation planning and reassess existing urban planning and regulations on land use control. In addition, comprehensive development plans should be formed by taking into account the schedules and finance plans of construction projects. Furthermore, resources from different governmental agencies should be integrated, and collaboration between cross-domain and local governments should be further improved.

(12)Formulate urban transportation planning with the concept of transit-oriented development (TOD) (Urban Transportation Policy 1 - Strategy 1)

This strategy aims to assist local governments in improving the overall arrangement of urban development and adopting transit-oriented development (TOD) concepts in transportation planning. This will improve building bulk control and traffic arrangement results for major constructions as well as urban planning projects. Meanwhile, road

landscaping development is conducted to build an ideal environment for public transportation and reduce citizens’ reliance on motor vehicles. This is expected to reduce congestion and environmental impacts such as air and noise pollution.

3.Major Courses of Action

Major courses of action responding to the aforementioned policies and strategies are as follows:

- ❶ **Conduct the Phase II Construction Project of Kaohsiung Intercontinental Container Terminal;**
- ❷ **Conduct the Taichung Port 2.0 Project, which integrates development of green energy, logistics, and tourist transportation;**
- ❸ **Conduct the construction plan of Terminal 3 and the 3rd Runway of Taoyuan International Airport;**
- ❹ **Construct new taxiway at Taichung Airport and a new terminal at Kaohsiung International Airport;**
- ❺ **Implement airport facility maintenance inspection and life cycle management;**
- ❻ **Conduct connecting roads construction for international airports and commercial ports: construction of National Freeway No.1A and No.7;**
- ❼ **Improve the freeway and expressway networks: Conduct National Freeway (NF) No.1 and Provincial Highway (PH) No. 65, No. 74; NF No.3 and PH No.66; NF No.4 and PH No.74; and the Second Expressway connecting Kaohsiung and Pingtung; and assess the project to connect NF No.5 and the Suhua Improvement Highway;**
- ❽ **Improve the island-round railway network: Evaluating and planning High Speed Railway extension, commuter railways between Keelung and Nangang, railway speed increase of the Nangang - Hualien section, and standard-gauge railways in eastern Taiwan;**
- ❾ **Publish the Rapid Transit Network Planning and Design Manual and establish comprehensive transportation planning standards for major metropolises;**
- ❿ **Enhance the maintenance and reinforcement mechanism for railway/highway facilities;**
- ⓫ **Conduct comprehensive planning for the development of regional railway/highway networks;**
- ⓬ **Develop port infrastructure and establish operation and maintenance mechanisms for state-owned vessels to meet passenger/cargo transport demand for offshore islands.**

Figure 7 Strategies to Achieve the Goal of Enhancing Transportation Efficacy



3.4



**Bolstering
Transportation
Industry
Development**

Bolstering Transportation Industry Development

Issue Conduct port inventory check in response to the development of offshore wind farms

- Strategies**
- Enhance management of operation vessels
 - Establish recruitment and training systems for Taiwanese crew
 - Complete facilities and services required in developing offshore wind farms

Issue Conduct a comprehensive impact analysis of Taiwanese shipping industry and formulate corresponding measures

- Strategies**
- Develop incentives for the shipping industry
 - Build a competitive operational environment through relaxed maritime and port regulations
 - Keep tabs on the global maritime transport market and formulate strategies accordingly

Issue Formulate diversified development plans to improve port operating performance

- Strategies**
- Conduct feasibility analyses of port-related businesses
 - Promote local wind power industry
 - Integrate local resources to achieve diversified port development

Issue Facilitate the development of transportation technology industry

- Strategies**
- Integrate resources to strengthen the innovative power of transportation technology industry
 - Build a comprehensive application and testing environment by introducing regulatory sandboxes

Issue Boost competitiveness of highway transportation through relaxing regulations and environmental limitations

- Strategies**
- Introduce a predetermined fare system for diversified taxi types
 - Facilitate digital transformation of car rental industry to provide diversified riding options
 - Review current assessment/evaluation criteria and management regulations of the tour bus industry
 - Complete relevant laws and regulations for the highway freight transportation industry

Issue Facilitate deep-rooted development in the aviation industry and improve the competitive positioning of industry operators

- Strategies**
- Build an efficient and diversified aviation logistics environment
 - Assist civil aviation operators in integrating the aircraft maintenance industry

Issue It is crucial to encourage railway operators creating for a more diversified value to achieve sustainable development

- Strategies**
- Establish the Railway Technical Research and Certification Institute
 - Integrate resources from the industry, government, academia, and research institutes and improve talent cultivation mechanisms
 - Regularly release maintenance requirements to the market to match supply and demand

The 2020 Transportation Policy White Paper covers the facilitation of bolstering transportation industry development in great detail, reflecting the ministry’s emphasis on the transportation industry. This section covers key issues concerning bolstering transportation industry development and corresponding policies and strategies formulated in the 2020 White Paper.

1. Key Issues

Current key issues concerning bolstering transportation industry development are as follows:

(1) Diversified development plans are needed to improve port operating performance

While freight transport constitutes the main business of a port, numerous measures can be considered to further enhance the operation performance of a port. These include: 1) Utilizing local tourism resources to develop cruise and related industries; 2) Developing express passenger/cargo transportation services between China and Taiwan to boost passenger transportation and express delivery services between the two regions; and 3) Building complete port infrastructure to develop wind power industry clusters, in line with the country’s energy transformation policy and diversified operation objective.



(2) To cope with a recession in the global maritime market, it is necessary to conduct a comprehensive impact analysis of the Taiwanese shipping industry and formulate corresponding measures

The global maritime transport fleet continues to grow, with total deadweight tonnage in 2017 reaching 1,862 million. In particular, container vessels have seen an 11-fold growth compared to that of 1990. Nevertheless, the global market is facing the challenge of imbalanced supply and demand. Therefore, it is necessary to conduct a thorough assessment of potential impacts on Taiwan’s shipping industry and formulate corresponding measures. In addition, statistics from UNCTAD indicate that Taiwan ranks 11 in terms of ownership of the global fleet, with foreign flags accounting for 86.6% of total deadweight tonnage. This implies that improvements can be made to increase the national flag. Furthermore, as major fleet operators worldwide are growing in business scale, fleet capacity has been consolidated, and Taiwanese fleets are losing their competitive positioning. This has led to severe challenges to Taiwan-based fleet operators. Therefore,

the government should keep track of market development and provide incentives to facilitate the growth of Taiwanese fleet operators.

(3) It is necessary to conduct port inventory check in response to the development of offshore wind farms

As offshore wind farm operators continue to produce or import new operation vessels, employee training should be arranged with reference to US and EU regulations, and technical standards for installation vessels and maintenance vessels should be established. In addition, to safeguard the shipping market within Taiwan’s territorial seas, cabotage, and national security, as well as to ensure that minimum requirements for passengers and crew members onboard is followed and that job opportunities for Taiwanese crew members is on the increase, operation vessels working in Taiwan should undergo regular inspections. Meanwhile, it is necessary to foster a more locally operated fleet. The government should coordinate ports and relevant stakeholders to boost the growth of the industry.

(4) To facilitate deep-rooted development in the aviation industry, it is essential to improve the competitive positioning of industry operators

The aviation industry consists of airlines, aircraft maintenance and manufacturing businesses, and logistics and transport companies. The rapid economic growth in the India-Pacific region has boosted the aviation industry, and to create business opportunities for domestic companies, the government should take measures to improve the capacity and flexibility of relevant operators to enhance the competitive positioning of Taiwan's aviation industry.

(5) It is crucial to encourage railway operators creating for a more diversified value to achieve sustainable development

Currently, Taiwan lacks experiences in railway design and integration and often relies on foreign businesses for key technologies, which results in high costs and risks. In addition, certification and verification mechanisms of relevant technologies remain unestablished, and the supply chain to independently produced trains in Taiwan has to be further developed. Furthermore, to deal with talent shortage in the railway industry, it is also necessary to build a proper talent training system.

(7) Currently the car rental and taxi industries are not able to meet consumer expectations, as such it is necessary to improve overall operations and the working environment

Due to technology advancement, new business models, and relaxed limitations on vehicle specifications, colors, and rates, traditional taxis can no longer satisfy the diverse needs of customers. Meanwhile, diversified taxis are slow in growth, and car rental industry are lags behind in digitalization. This indicates that existing operation and supervision systems remain to be updated and revised.

(8) To boost competitiveness of highway freight transportation, regulational and environmental limitations have to be loosened

The current legal system fails to meet the needs of the highway freight transportation industry. Challenges include: 1) Regulations governing industry classification and entry barriers have restricted the business size of the operators and resulted in actual number lower than the threshold and low operation flexibility. 2) Operators in the industry have to purchase their own fleets, and this has increased

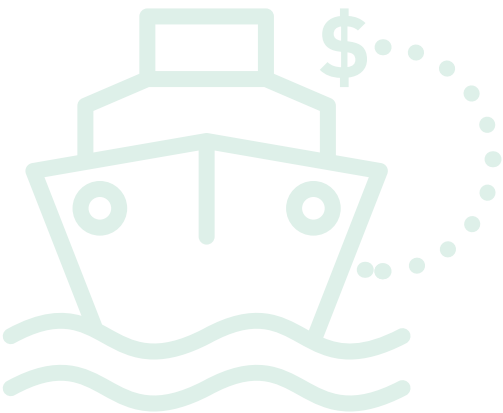
costs and reduced operation flexibility. In addition, the current entry barrier is decided by the number of small and large trucks. Although court decisions put scooters and cars in the same category and regard scooters as vehicles for urban transport, for companies that want one to adopt single, emerging vehicles, the current legal system is not advanced enough to allow such a business model. Furthermore, due to social and economic changes, demand for courier delivery services has soared, which in turn leads to a need for more distribution centers and new distribution models. However, in areas that are densely populated, it is often impossible to build warehouses and distribution centers.

(9) To develop intelligent transportation applications and services and build a suitable environment, it is necessary to facilitate the development of transportation technology industry

Intelligent transport systems are often complicated and contains numerous interfaces. These systems often function across different agencies, systems, and even countries. In addition, the application of innovative technologies as well as the launch of new transport



services/products often take countless field experiments, trial installations, and preliminary adoptions before entering the market. Guidance and support from the government as well as partnership with transport service providers and relevant industries play a key role in successfully developing such services/ products. However, there is no platform for interdepartmental communication on intelligent transportation services. Coordination across organizations is therefore low in efficiency and hard to keep track of. A interdepartmental coordination platform needs to be built to enhance efficiency in the intelligent transportation industry.



2.Policies and Strategies

Refer to Figure 8 for policies and strategies regarding bolstering transportation industry development. Details of each item are as follows:

(1) Conduct practical assessments of opportunities for diversified port operations by the perspective of intergrating resources (International Transportation Policy 1 - Strategy 2)

To increase the value of ports and improve their performance, the strategy aims to assess investment possibility in ports and related businesses from the perspective of corporate management. It also aims to foster the offshore wind power industry in response to national policy, integrate local resources, and break through the limitations of current port business.

(2) Build a better business environment for the shipping industry (International Transportation Policy 2 - Strategy 1)

Vessel capacity in maritime transport industry has seen the challenge of oversupply for many years. The keen competition in the market has led to several

acquisition and merger cases among global container vessel operators, while some have ended bankrupt due to poor business. To address the difficult market Taiwanese vessel operators are situated in, this strategy aims to provide incentives for the maritime transport industry and improve the competitive positioning of Taiwanese vessel operators. Meanwhile, relaxation of maritime and port regulations has to be continued to create an advantageous business environment for companies. Authorities concerned should keep track of global maritime transport trends and adjust strategies accordingly.

(3) Formulate comprehensive overseas investment plans (International Transportation Policy 2 - Strategy 2)

Considering the rapid economic growth in New Southbound countries in recent years and to respond to the government’s New Southbound Policy, Taiwan International Ports Corporation has been increasing its overseas investment targets. For example, in Indonesia, YangMing Marine Transport Corporation has worked together with local enterprises to invest in PT Formosa Sejati Logistics. In Singapore, YangMing,

Chunghwa Post Corporation, and transport business from Taiwan have established Taiwan Foundation International Pte. Ltd. together to invest in port and maritime industries in southeast Asia. This strategy aims to facilitate communication with authorities concerned in the New Southbound countries, collect market information and legal references, and expand overseas investment through overseas holding enterprises.

(4) Develop complete maritime regulations and port infrastructure for the renewable energy industry (International Transportation Policy 2 - Strategy 4)

In response to the national policy to develop the offshore wind power industry, the MOTC has formulated corresponding measures in terms of port development and maritime security. The strategy aims to build a comprehensive management system for operation vessels as well as talent recruitment and training programs. Meanwhile, facilities and services necessary to foster the offshore wind power industry have to be completed, offering an advantageous business environment for stakeholders.

(5) Develop regulations governing international re-export and value-added export services in the Free Trade Zones (International Transportation Policy 2 - Strategy 6)

To further improve the competitive positioning of Free Trade Zones and to respond to the government New Southbound Policy, this strategy aims to closely connect the development of industry and the port zone and build an attractive investment environment for the industry, further adding value to the free trade zone.

(6) Provide necessary support to improve the competitive positioning of aviation industry operators (International Transportation Policy 4 - Strategy 5)

The rapid economic growth of the India-Pacific region has boosted the aviation industry. To help Taiwanese companies in winning business opportunities, it is necessary to improve their operational performance and flexibility, which helps increase the competitive positioning of Taiwan’s aviation industry. This strategy includes establishment of an efficient and diverse air freight and logistics industry, integration of the

aircraft maintenance industry, and amendment of outdated civil aviation laws and regulations.

(7) Create business opportunities for railway-related industries and improve competitive positioning (Intercity Transportation Policy 2 - Strategy 5)

This strategy aims to establish the Railway Technical Research and Certification Institute, which helps increase the stability of track and rolling stock parts and components, develop research and development capacity, and establish national standards for railway systems. In addition, through integrated resources from the government, industry, academia, and research institutes, it is expected to foster talent development and cultivation. Furthermore, the strategy also aims to increase the proportion of maintenance parts for railway systems that are made in Taiwan. After taking inventory of parts that need to be manufactured locally, relevant technologies have to be integrated to create a subsystem. The government also works with railway operators to release maintenance demand on a regular basis. Symposiums on business opportunities will also be held to match suppliers and buyers in the

industry, with the goal of achieving self-maintenance in the end.

(8) Improve the management regulations of the tour bus industry (Intercity Transportation Policy 4 - Strategy 1)

The focus of this strategy includes: 1) Reassessment of the entry barrier of the tour bus industry as well as its insurance and management systems. 2) Reassessment of current driver management system to improve working environment. 3) Reassessment of current evaluation mechanisms in the tour bus industry. 4) Reassessment of the positioning of the tour bus industry to ponder the dipartition of business in future.

(9) Complete relevant laws and regulations for the highway freight transportation industry (Intercity Transportation Policy 5 - Strategy 1)

This strategy aims to reassess entry barriers of the highway freight transportation industry, including capital and vehicle number requirements and build up safety management mechanisms. It also aims to relieve limitations of transport vehicles in the industry,

and seeks to approve three-wheeled electric scooters, autonomous vehicles, and rental vehicles, and reassess current restrictions on scooters.

(10) Improve highway freight terminals (Intercity Transportation Policy 5 - Strategy 2)

This strategy aims to build comprehensive transfer systems and improve service quality. This includes construction of distribution centers in urban areas for intercity transportation and relief of land-relevant regulations governing the construction of distribution centers. Furthermore, measures are being assessed to increase cargo handling space in urban areas, such as arrangement of in-building spaces for trucks loading/unloading cargo.



(11) Improve the business environment for car rental and taxi industries (Urban Transportation Policy 4 -Strategy 1)

This strategy aims to lower taxi vacancy rate by formulating a practical taxi fleet volume control mechanism. In addition, advanced information and communication technologies as well as new business models will be introduced to improve business performance and corporate efficiency. In addition, the latest technology is utilized to introduce predetermined fare system for diversified taxi types. This is expected to facilitate digital transformation of car rental and taxi industries. Furthermore, the strategy also aims to provide diverse options for consumers through upgraded service models.

(12) Continuously strive to develop the transportation technology industry (Intelligent Transportation Policy 4 - Strategy 1)

This strategy aims to integrate resources across different sections in the MOTC through the Transportation Technology Industry Committee and further boost innovation in the transportation technology industry and collaboration among relevant industries.

In addition, artificial intelligence and deep learning have been introduced to transportation management and traffic control to further improve the efficiency and safety of transportation systems. The strategy also encourages businesses in Taiwan to propose innovative total solutions and create service application paradigms.

Furthermore, the strategy aims to enhance the environment of systematic certification fields and introduce the concept of regulatory sandboxes. These steps will further bolster industry development as well as package plant export.

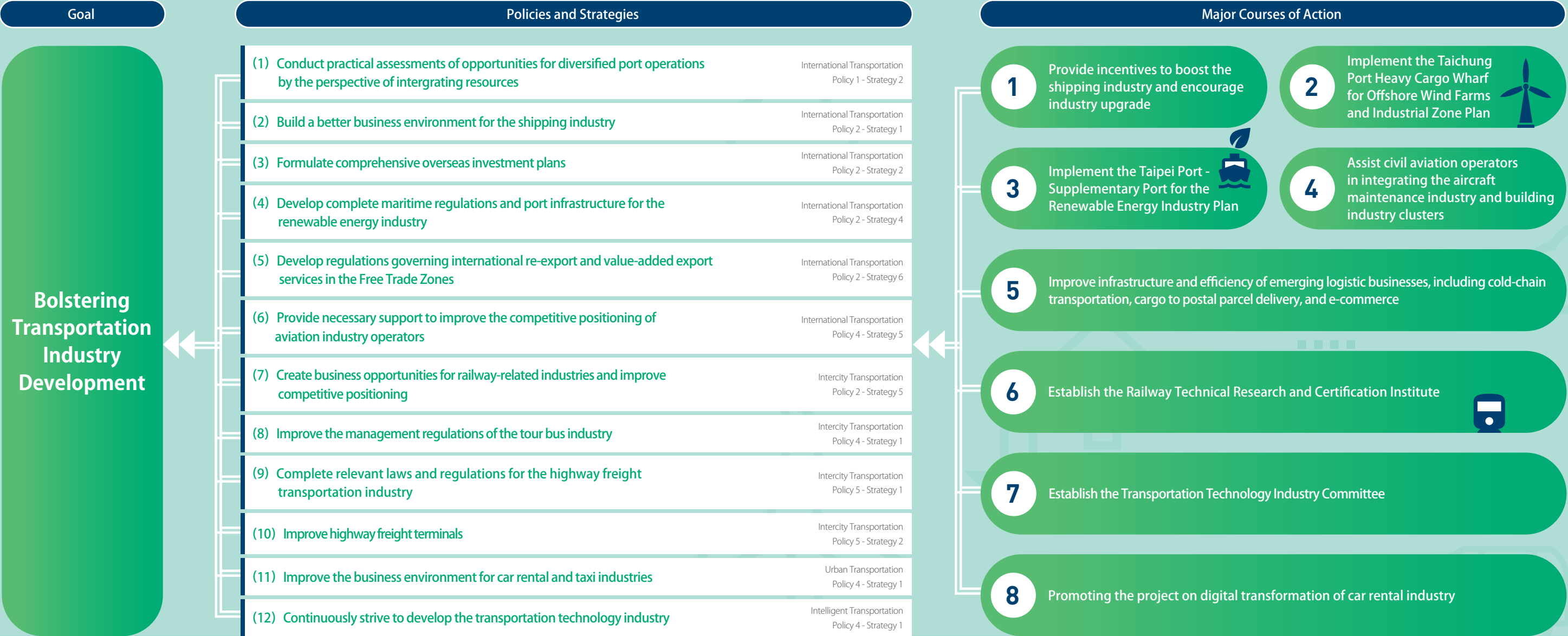


3.Major Courses of Action

Major courses of action responding to the aforementioned policies and strategies are as follows:

- ➊ Provide incentives to boost the shipping industry and encourage industry upgrade;
- ➋ Implement the Taichung Port Heavy Cargo Wharf for Offshore Wind Farms and Industrial Zone Plan;
- ➌ Implement the Taipei Port - Supplementary Port for the Renewable Energy Industry Plan;
- ➍ Assist civil aviation operators in integrating the aircraft maintenance industry and building industry clusters;
- ➎ Improve infrastructure and efficiency of emerging logistic businesses, including cold-chain transportation, cargo to postal parcel delivery, and e-commerce;
- ➏ Establish the Railway Technical Research and Certification Institute;
- ➐ Establish the Transportation Technology Industry Committee (including teams of ten industries: smart electric scooters, unmanned aircraft systems (UAS), railway technology, smart electric buses, smart ports and airport services, transportation big data, intelligent logistics, smart public transportation services, intelligent transportation experimental fields, and bicycles and tourism);
- ➑ Promoting the project on digital transformation of car rental industry.

Figure 8 Strategies to Achieve the Goal of Bolstering Transportation Industry Development



3.5



Implementing Human-Oriented Transportation

Implementing Human-Oriented Transportation

Issue Advocate passenger ship and dock accessibility to implement human-oriented transportation

- Strategies**
- Advocate for a barrier-free environment for passenger ships and docks
 - Create an environment conducive to maritime passenger transport



Issue Accommodate diversified development of airports and user characteristics with a human-oriented environment

- Strategies**
- Promote universalization of airport facilities and operations
 - Strengthen collaboration with local governments to bolster local tourism



Issue Enhance urban walkability to avoid pedestrian-vehicle conflicts

- Strategies**
- Improve walkability with universal design and complete streets concept
 - Examine and upgrade walkability of transfer stations



Think from the Perspective of a Different User



Issue Provide adapted highway public transport services in response to challenging road construction and maintenance in mountains and rural areas

- Strategies**
- Maintain regular road services in rural mountain areas
 - Ensure sustainable operations with an improved subsidy mechanism for rural bus services
 - Adopt flexible operations for better highway public transport services in rural areas
 - Propose amendments to facilitate highway public transport development in rural areas

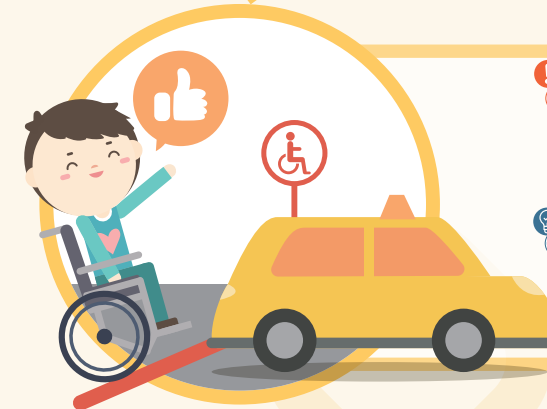


Issue Enhance barrier-free transport services for people with reduced mobility and the elderly

- Strategies**
- Provide more barrier-free buses and enhancing the disclosure of their timetable information
 - Upgrade software services to ensure the accessibility of public transportation in order to assist all passengers with reduced mobility

Issue Encourage more wheelchair accessible taxi (WAT) services to join the market and meet future needs in society

- Strategies**
- Establish a database for evaluating taxi drivers, including service ratings, driving records, etc
 - Provide incentives for drivers to provide wheelchair accessible taxi (WAT) services to meet the needs in hyper-aged society



As one of the visions of the 2020 Transportation Policy White Paper, of the people, for the people aims to build a traffic system from users’ perspectives and create a user-friendly environment for underprivileged people. This section covers key issues concerning human-oriented transportation and corresponding policies and strategies formulated in the 2020 White Paper.



1. Key Issues

Current key issues concerning implementing human-oriented transportation are as follows:

(1) It is necessary to advocate passenger ship and dock accessibility in order to achieve the goal of implementing human-oriented transportation

Currently, the docking facilities in Taiwan, including facilities and equipment connecting ferries and docks, are not friendly for people with disabilities, the elderly, and others with reduced mobility. Starting from January 9th 2017, according to the regulations, all newly-built or imported passenger ships have to be equipped with barrier-free facilities. Many passenger ships currently used, including passenger small ships, have narrow hatch doors, alleyways, and stairs, causing trouble for wheelchair users. Therefore, it is important to promote the universal design of ship and dock facilities and make maritime passenger transport more user-friendly.

(2) To provide a human-oriented environment at airports, it is important to take the diversified development of airports and user characteristics into consideration

Airports not only provide transport services, but also serve the functions of tourism and shopping, bringing in non-aeronautical revenues. They help cities become more internationally connected, attract tourists and business travelers, stimulate the development of airport-related industries, and benefit areas surrounding the airports. As a result, it is necessary to highlight airport features, provide user-friendly environments, and generate more operational benefits for airports.

(3) It is vital to enhance urban walkability and avoid pedestrian-vehicle conflicts

Walking is the most fundamental form of transportation. It is also the first and last mile between public transport and home/office. Urban areas are densely populated with intensive residential and commercial development and business activities. For an aging society, low walkability could be detrimental to the quality of public transport services. In addition,

the current road design is in favor of car users instead of pedestrians, cyclists, motorcycle riders, and public transport vehicles. Roadside parking is also common in Taiwan, so when it comes to widening sidewalks, there are disputes involving fewer lanes and reduced on-street parking spaces. Thus, urban walkability has to be enhanced to avoid pedestrian-vehicle conflicts.

(4) To meet future needs in society, it is indispensable to encourage more wheelchair accessible taxi (WAT) services to join the market

According to the National Development Council (NDC), Taiwan is anticipated to become a hyper-aged society by 2026. Aged societies are characterized by an increasing population of people with frailty, chronic diseases, and disabilities, which means more and more people will need transport services to receive long-term care, go to the hospital, and rehabilitate. By the end of 2018, there were merely 900 or so wheelchair accessible taxi (WAT), which accounted for 1% of the total number of taxis in Taiwan. Hence, in order to meet future needs in society, it is essential that the government use policy instruments and assist taxi companies in joining the market of wheelchair

accessible taxi (WAT). Furthermore, to improve the quality of taxi services and ensure road safety, it is also important to help drivers relieve their stress by providing timely care and guidance.

(5) Considering that taking buses is not convenient for people with reduced mobility and the elderly, it is necessary to enhance barrier-free transport services

Currently, the accessibility of both hardware equipment and software services on buses and at bus stations remain to be improved. Besides, the frequency and timetable information of barrier-free buses are not sufficient. Therefore, it is necessary to enhance barrier-free transport services.

(6) Seeing how urban bus services are not as appealing as private vehicles, it is imperative to reduce the gap between them

Travelling by bus cannot compete with private vehicles both timewise or cost-wise. Bus services leave a lot to be desired, including punctuality, transfer time, hardware and software equipment, and driver attitudes. As a result, a bus service that can compare with private vehicles is crucial.

(7) In response to challenging road construction and maintenance in mountains and rural areas, it is indispensable to ensure road safety and the well-being of rural communities

It is difficult to build the winding and steep mountain roads in rural areas with the same design standards. Many roads are too narrow and lack slope protection or even traffic safety facilities. On top of that, geological instability in the mountains makes it prone to landslides that block rural roads whenever heavy rain or an earthquake hits. This has made an impact on the commuters in rural areas and the development of local industries and tourism. Most of these roads are simply restored afterwards without large-scale maintenance plans, causing road safety concerns. As a consequence, it is fundamental that the government ensure road safety and the well-being of rural communities.

(8) Considering taking bus is not convenient enough in rural areas, it is necessary to strengthen the provision of adapted public transport services based on local conditions

Rural areas are not conducive for the

development of public transportation. With low ridership and revenues, it is not possible to attract bus carriers to operate in rural areas willingly. Since the survival of these bus routes rely heavily on the government’s subsidies to cover the operational losses, the headway is long and the service coverage is also limited. Fixed routes and timetables might not be suitable for residents in rural areas or cost-effective. In addition, the operational standards of public transportation in rural areas are not flexible and adaptable to local conditions. More specified standards for Demand Responsive Transit Services (DRTS) should be included as well. As for allowing private cars to offer public transportation in rural areas and allowing buses to carry freight to remote villages, further discussion is required before reaching a consensus.



2.Policies and Strategies

Refer to Figure 9 for policies and strategies regarding implementing human-oriented transportation. Details of each item are as follows:

(1) Provide barrier-free maritime passenger transport from a human-oriented perspective (International Transportation Policy 1 - Strategy 3)

To further provide barrier-free facilities, this strategy examines current laws and regulations and assists local governments with the establishment of barrier-free docking facilities, creating a more friendly environment for maritime passenger transport.

(2) Highlight airport features and provide human-oriented friendly services (International Transportation Policy 3 - Strategy 5)

It is important to highlight airport features by incorporating customs, traditions, and cultural diversity into the design, while also taking different user needs into consideration. This helps create a user-friendly environment with stellar services in airport terminals. This strategy aims to promote the

universalization of airport facilities and operations, and strengthen the collaboration between airports and local governments to bolster local tourism.

(3) Introduce human-oriented concepts to urban design and management (Urban Transportation Policy 1 - Strategy 2)

In response to a hyper-aged society with a low birth rate in the future, walkability has to be improved with changes in the design of roads, which currently favors cars over people. Focusing on the phase of urban planning and urban design, this strategy includes the notion of human-oriented transportation to the design, improved walkability, and ensures the right of way for all means of transportation. Additionally, with the use of universal design and



complete street concept, more and more sidewalks must be built and covered sidewalks (arcades) must be levelled and cleared. Along with thorough examination and improvements in the walkability of transfer stations, surrounding areas of stations, and lanes and alleys, this strategy paves the way for disaster relief operations and emergency assistance.

(4) Enhance barrier-free bus transport services (Urban Transportation Policy 2 - Strategy 2)

Since 2010, MOTC has subsidized the purchase of about 4,000 barrier-free buses, including low-floor buses and buses equipped with wheelchair lifts. However, the number of barrier-free buses only accounts for a small part of the number of all buses in some cities and counties. This strategy aims to provide more barrier-free buses and enhancing the disclosure of their timetable information of barrier-free services in order to comply with the regulations of the People with Disabilities Rights Protection Act and meet the needs of an aged society. In the future, software services will also be enhanced to ensure the accessibility of public transportation in order to assist all passengers with reduced mobility.

(5) Improve seamless transport services and increase transfer incentives (Urban Transportation Policy 2 - Strategy 3)

This strategy focuses on strengthening the multi-modal transfer services between highway public transport and other modes, including transfer between rail transport and motor transport, trunk buses and feeder services, and the last mile between bus services and final destinations. From the planning of routes and schedules to the establishment of transfer facilities and fare structure, all decisions should be in favor of passenger transfer, hoping to encourage more passengers to be more open to transfers in lieu of purely direct routes.



(6) Provide care to taxi drivers and encourage them to join the wheelchair accessible taxi (WAT) market (Urban Transportation Policy 4 - Strategy 2)

The highlight of this strategy is subsidizing the establishment of care service centers for taxi drivers and a database of drivers’ ratings, driving records, and other information. To meet the needs of a hyper-aged society, the government will continue to introduce more drivers to the wheelchair accessible taxi (WAT) market and bolster its service performance with the integration of supply and demand.

(7) Maintain regular road services in rural mountain areas (Offshore Island and Rural Transportation Policy 2 - Strategy 1)

Maintainance of regular road and back-up road services in rural mountain areas needs to be continue to ensure the well-being rights of rural communities, and the soil and water conservation in road construction projects should also be strengthened. Without widening or building new roads, this strategy emphasizes the improvements and maintenance of road safety facilities, including road pavements, side slopes, guardrails, roadside mirrors, and delineators.

(8) Ensure sustainable operations with an improved subsidy mechanism for rural bus services (Offshore Island and Rural Transportation Policy 2 - Strategy 2)

Rural areas are not conducive for the development of public transportation. However, in order to bridge the urban-rural divide and make lives more convenient for rural residents, public transportation in rural areas is without a doubt a necessity. This strategy aims to continue offering subsidies for bus routes with deficit in order to solve the problem of insufficient ticket income. Besides, the subsidy mechanism should be improved to stimulate service providers to bolster their operational performances.

(9) Adopt flexible operations for better highway public transport services in rural areas (Offshore Island and Rural Transportation Policy 2 - Strategy 3)

Given that it is unlikely to add more bus services in rural areas in the near future, this strategy highlights the convenience and comfort of taking public transportation by upgrading waiting areas and introducing a real-time bus information system. In addition, more flexible modes of operation will be

under review to meet the needs of rural residents and lower operational costs.

(10) Propose amendments to facilitate highway public transport development in rural areas (Offshore Island and Rural Transportation Policy 2 - Strategy 4)

The Demand Responsive Transit Services (DRTS) has been considered one of the most crucial ways to improve the public transport services and lower operational costs in rural areas. In addition to buses, DRTS also includes tour buses, taxis, and vehicles owned by township offices in operation, providing more diversified services. Therefore, this strategy aims to resolve the concerns for operational standards of DRTS and propose corresponding amendments. Taking reference from Japan's operational standards of allowing local private cars to offer public services in rural areas, MOTC will analyze the feasibility and operational standards of such operation mode in Taiwan. Furthermore, the government will deliberate on the appropriateness of allowing bus to carry freight in rural areas and related standards, while ensuring road safety and maintaining the order of freight transportation industry.

3.Major Courses of Action

Major courses of action responding to the aforementioned policies and strategies are as follows:

- ➊ Advocate for a barrier-free environment for passenger ships and docks;
- ➋ Promote the universalization of airport facilities and operations;
- ➌ Enhance walkability with improved urban design;
- ➍ Ensure the reasonable right-of-way for all means of transportation;
- ➎ Introduce more barrier-free buses by subsidy and administrative guide;
- ➏ Introduce more Demand Responsive Transit Services (incl. DRTS buses and taxi buses);
- ➐ Maintain rural public transport services;
- ➑ Deliberate whether to allow local private cars/buses to offer public transportation services/freight services in rural areas and the necessary regulations;
- ➒ Launch a pilot project for promoting contracted fleet system of wheelchair accessible taxi (WAT);
- ➓ Upgrade transfer facilities with integrated timetables for trunk-and-feeder services.

Figure 9 Strategies to Achieve the Goal of Implementing Human-Oriented Transportation



3.6



Supporting Tourism Development

Supporting Tourism Development

Issue Support sustainable development of rail transport and create diversified value for railway tourism

Strategies

- Forge cross-industry alliances for a more diversified value creation of railway transport

Issue Actively expand Taiwan's international aviation network

Strategies

- Strengthen the connection with New Southbound countries and form an extensive aviation network

Issue Develop Taiwan into an air transport hub

Strategies

- Supervise airline carriers for high-quality and reliable air transport services

Issue The transparency of tour bus services is poor and their connection with other industries is lacking

Strategies

- Reinforce the connection between tour bus service providers, passengers, and stakeholders

Issue Respond to the growing maritime passenger transport business

Strategies

- Optimize port passenger facilities and services from the passengers' perspective

Issue Build the image of Taiwan as an island of tourism

Strategies

- Actively improve road landscaping, which can develop in running, cycling, environmental education, and photography

Issue Facilitate the development of cycling tourism industry

Strategies

- Upgrade island-round cycling routes and build up an extensive cycling network, push forward with law amendments, and implement safety education

Issue Respond to the development of maritime tourism

Strategies

- Construct the Blue Highway of maritime passenger transport with integrated maritime, port and tourism resources

International tourism represents the soft power of Taiwan, while domestic tourism is also an important leisure activity for Taiwan residents. Therefore, supporting Taiwan international and domestic tourism is a crucial chapter both in the administrative plan by MOTC and in the 2020 Transportation Policy White Paper. This section covers key issues concerning supporting tourism development and corresponding policies and strategies formulated in the 2020 White Paper.

1. Key Issues

Current key issues concerning supporting tourism development are as follows:

(1) In response to the growing maritime passenger transport business, it is essential to upgrade port passenger services and facilities

The cruise market in Taiwan has been booming in recent years, and it is necessary to continue improving facilities in Keelung Port and Kaohsiung Port to fulfill the government’s policy to develop two cruise homeports, one in the south and one in the north. This includes improvements of facilities, spatial design, expansion of luggage storage space, and construction of the Kaohsiung Port Passenger center. The strategy will help adapt to increasing vessel cruise size and provide tourists with a cozy and convenient clearance space.

(2) Respond to the development of maritime tourism, it is necessary to integrate resources and complete related services

Taiwan is abundant in marine resources. In recent years, exciting marine activities such as surfing,

diving, canoeing, and offshore island excursions have become increasingly popular. However, there are not enough public berths for yachts and recreational boats in most fishing ports and the four marinas in Taiwan, which is not conducive to the promotion of marine activities. In the future, in order to develop maritime tourism, the government will collaborate with the Fisheries Regulation Division on the development of highlighted fishing ports and the transformation of low utilization ports, evaluate the needs of marine tourist attractions, plan more public boat parking spots, and provide quality boat services.

(3) To develop Taiwan into an air transport hub and strengthen the connection with New Southbound countries, it is important to actively expand Taiwan’s international aviation network

To become an air transport hub, an airport needs to be supported with an extensive aviation network. In recent years, the government has been promoting the “New Southbound Policy” to form a strong aviation network and facilitate the connections between Taiwan and the “New Southbound” countries. By strengthening the aviation network between Taiwan

and other countries, it allows Taiwanese airline carriers to attract and bring together more passengers. Moreover, it will help Taiwan welcome more visitors and become a crucial air transport hub in the global aviation network.

(4) In order to supervise Taiwanese airline carriers for high-quality and reliable air transport services, it is fundamental to ensure their steady operation accompanied with strengthened consumer protection measures

In recent years, unexpected events, such as suspension of flights, strikes by crew members, and airline bankruptcies, have undermined consumer rights. To comply with the ICAO Core Principles on Consumer Protection, it is necessary to strengthen the consumer protection measures in Taiwan after taking into consideration of social and economic factors, aviation safety, and business competitiveness. It is also important to refer to the approaches other countries take and consider the air transport environment in Taiwan. The strengthened measures serve as criteria for service providers and consumers and aim to provide quality aviation services in Taiwan.

(5) To improve tour bus services, it is necessary to include technology into the mechanism for tour bus management

There are two major problems in the current mechanism for tour bus management: lack of transparency and lack of connections with other industries. Lack of transparency includes: 1) The contracted tour bus drivers are not employees of any tour bus companies, which results in the lack of transparency in the tour bus market. 2) The current information disclosure still has a lot to improve, including the disclosure of the GPS real-time information system. Lack of connections with other industries include: 1) The lack of connection between bus carriers and the stakeholders may jeopardize road safety. 2) The cross-industry application of ICT should be enhanced.

(6) The island-round cycling network has been formed to bolster cycling and tourism development. Further work will be done to ensure a safe and user-friendly cycling network

According to the 2017 Bicycle Use Survey by the MOTC, most people ride bicycles for recreation or exercise, which accounted for 42.2%. The island-

round cycling route has been formed with more and more people choosing bicycles as a means of transport in tourism. To further bolster cycling and tourism development, the issues that are required to address include: 1) Due to the lack of road space, bike and scooter riders have to share lanes. 2) The formulation of bike regulations are still in progress, while road safety education has yet to be implemented. 3) The implementation plans of cycling projects by different agencies vary, so further coordination will be needed.

(7) To support the sustainable development of rail transport, diversified value creation for rail transport should be encouraged

It is advisable to refer to industry trends and business models and introduce transit-oriented development (TOD) and smart stations to provide railway companies more opportunities for development of subsidiary businesses or cross-industry alliances. The growth of railway tourism is slow-paced, so it is recommended to follow the domestic tourism policies and break into new markets for rail transport. By incorporating railway tourism into its business strategies, along with placemaking, rail history, and cultural heritage, more diversified value will be created.

2.Policies and Strategies

Refer to Figure 10 for policies and strategies regarding supporting tourism development. Details of each item are as follows:

(1) Optimize port passenger facilities and services from the passengers’ perspectives (Offshore Island and Rural Transportation Policy 1 - Strategy 3)

To enhance the service quality of maritime transport and the itineraries for cruise passengers, this strategy aims to optimize maritime transport facilities and services. By setting up passenger information systems, passengers can enjoy the convenience and comfort of transport services.

(2) Construct the Blue Highway of maritime passenger transport with integrated port and tourism resources (Offshore Island and Rural Transportation Policy 1 - Strategy 4)

The Blue Highway serves as an alternative to land transport as well as the function of maritime tourism. Apart from accommodating shuttle boats between the main island of Taiwan and offshore islands, the

Blue Highway is planned to fulfill its function of tourism. This strategy focuses on resource integration, international cruise tourism, cruise routes to eastern Taiwan and offshore islands, and the diverse development of maritime tourism.

(3) Actively expand Taiwan’s international aviation network (International Transportation Policy 4 - Strategy 1)

The density of Taiwan's aviation network needs to be improved with consideration of airport competitiveness, sustainable operations of airline carriers, and industrial development, this strategy strives to integrate Taiwan into the global aviation network and welcome more visitors to Taiwan.

(4) Actively improve road landscaping (Intercity Transportation Policy 3 - Strategy 1)

This strategy highlights road landscaping of provincial highways with themed landscaping plans. In accordance with local features, these highways are designated to serve different functions, including cycling, road running, environmental education, recreation, and photography. This shapes the image

of Taiwan into an island of tourism.

(5) Reinforce the connection between tour bus service providers, passengers, and stakeholders (Intercity Transportation Policy 4 - Strategy 2)

This strategy aims to use the existing real-time information system, allow service providers to manage themselves, and make motor vehicle driver information service accessible by scanning QR codes. In the future, the authorities can access the information and provide it for the government agencies and academia to conduct research, making sure that the operational costs are reasonable and transparent. Furthermore, a rolling review of standard form contracts for chartered tour buses will be introduced to protect passengers’ rights.

(6) Forge cross-industry alliances for a more diversified value creation of railway transport (Intercity Transportation Policy 2 - Strategy 4)

This strategy endeavors to introduce tourism into railway transport. The adapted rail operation on weekends and diverse carriage design will help build the image of railway tourism. With collaborations with local communities, other transport systems, and tourism

businesses and offers such as tourist packages or tourist passes, railway tourism is expected to be more convenient for tourists. In addition, along with placemaking initiatives by the NDC and the Taiwan Small Town Ramble campaign presented by the Tourism Bureau, railway resources will be integrated and collaborations with local communities will be strengthened, achieving the goal of common prosperity across tourism, transport, and local development. By combining the cultural heritage of TRA with creativity, there are opportunities for the development of the railway cultural and creative industry.

(7) Upgrade island-round cycling routes and build up an extensive cycling network (Green Transportation Policy 1 - Strategy 2)

This strategy puts emphasis on building various themed cycling routes and optimizing the cycling environment. By including cycling into life, recreational activities, and tourism and improving road safety, this strategy will encourage more people to ride bicycles.

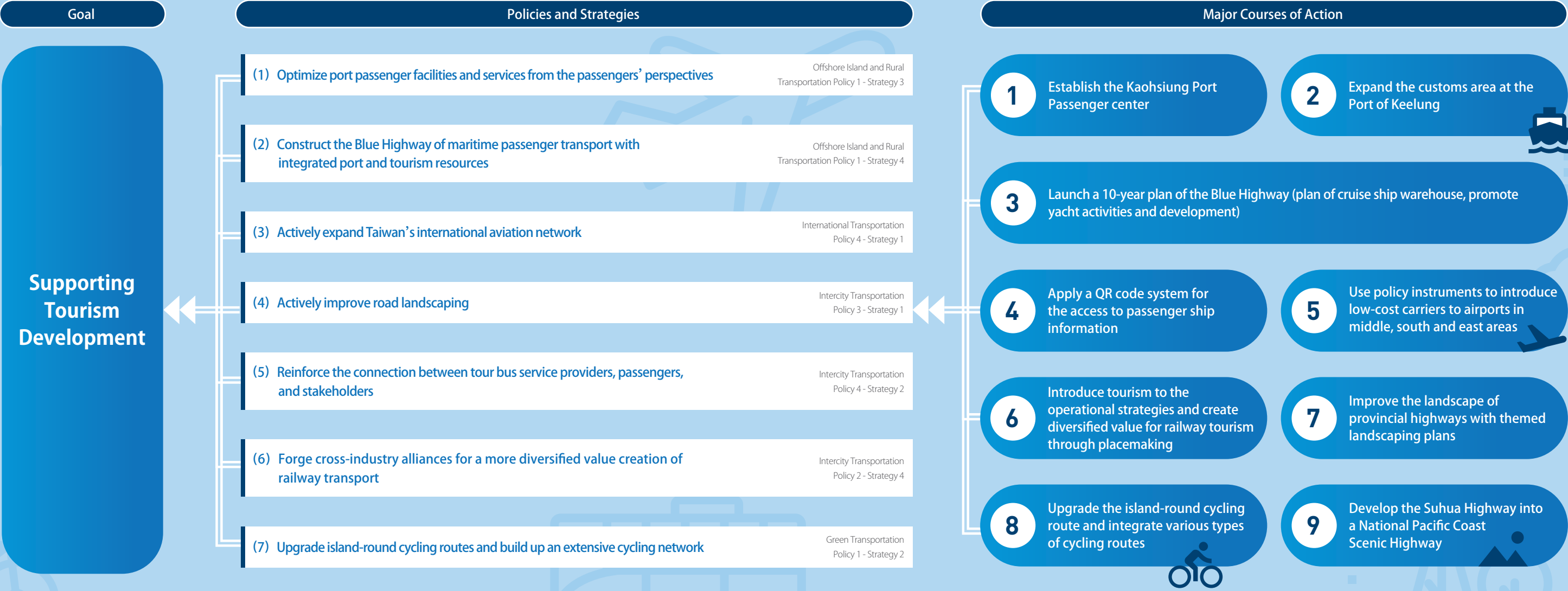
3.Major Courses of Action

Major courses of action responding to the aforementioned policies and strategies are as follows:

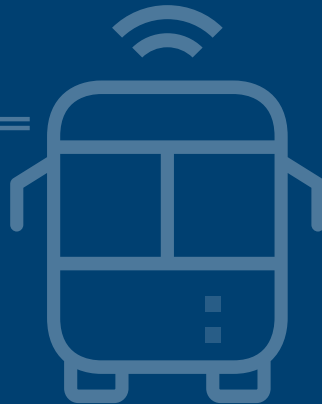
- ❶ Establish the Kaohsiung Port Passenger center;
- ❷ Expand the customs area at the Port of Keelung;
- ❸ Launch a 10-year plan of the Blue Highway (plan of cruise ship warehouse, promote yacht activities and development);
- ❹ Apply a QR code system for the access to passenger ship information;
- ❺ Use policy instruments to introduce low-cost carriers to airports in middle, south and east areas;
- ❻ Introduce tourism to the operational strategies and create diversified value for railway tourism through placemaking;
- ❼ Improve the landscape of provincial highways with themed landscaping plans;
- ❽ Upgrade the island-round cycling route and integrate various types of cycling routes;
- ❾ Develop the Suhua Highway into a National Pacific Coast Scenic Highway.



Figure 10 Strategies to Achieve the Goal of Supporting Tourism Development



3.7



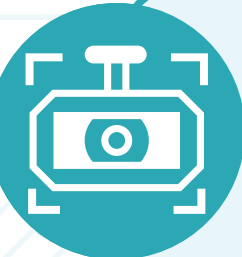
Advocating Intelligent Transportation

Advocating Intelligent Transportation



Issue Local authorities and transport operators are yet to properly connect, respond to adapting the demand of intelligent transportation and innovative technology developments

- Strategies**
- Advocate traffic data collection, open data and big data analysis applications, with the government as an integration center
 - Build a comprehensive experimental field on a system level and introduce regulatory sandboxes
 - Continuously strive to develop the transportation technology industry



Issue Leverage smart traffic management measures and related services to enhance traffic safety and efficiency

- Strategies**
- Conduct MaaS and Integrated Corridor Management (ICM)
 - Develop AI-related applications
 - Conduct Cooperative Intelligent Transport Systems (C-ITS) and the testing and servicing of unmanned vehicle applications



Issue Adapt to the trend of maritime transport digitalization

- Strategies**
- Conduct smart transformations of maritime and ports



Issue Adapt to the new technology development trend and enhance airport operational efficiency

- Strategies**
- Continue to advocate smart, digital airports



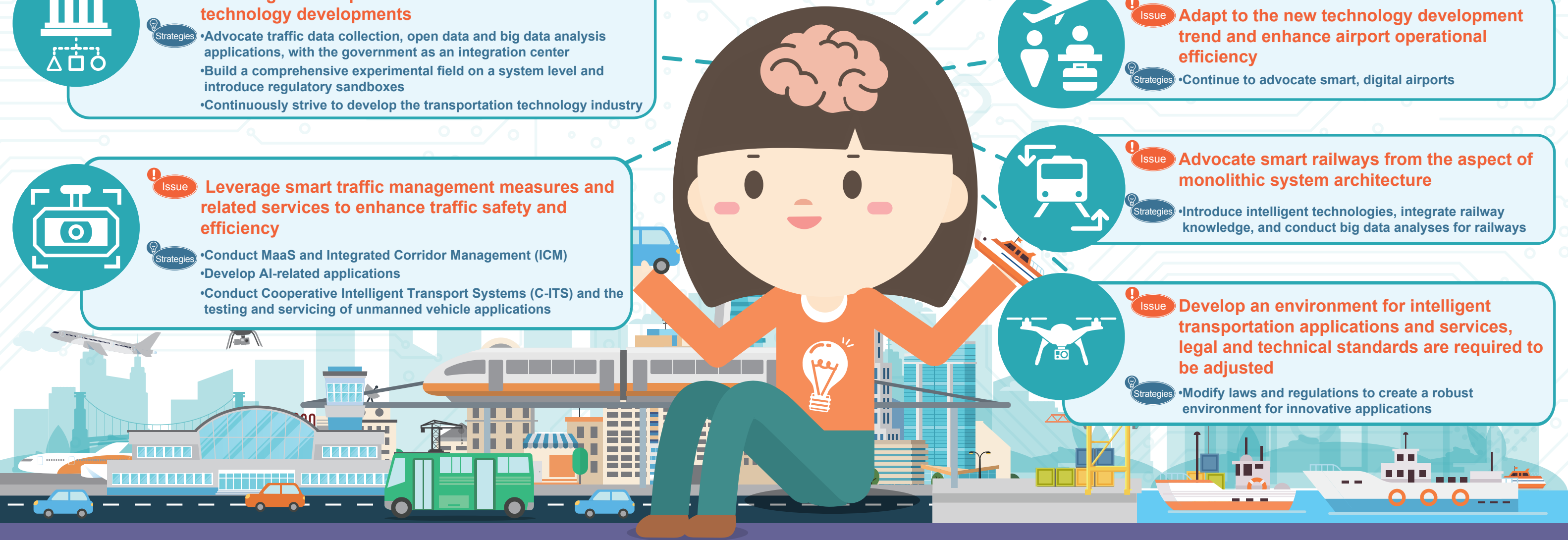
Issue Advocate smart railways from the aspect of monolithic system architecture

- Strategies**
- Introduce intelligent technologies, integrate railway knowledge, and conduct big data analyses for railways



Issue Develop an environment for intelligent transportation applications and services, legal and technical standards are required to be adjusted

- Strategies**
- Modify laws and regulations to create a robust environment for innovative applications



Advocating intelligent transportation is one of the key development goals of MOTC. In the 2020 Transportation Policy White Paper, the section of advocating intelligent transportation features intelligence and innovation as its central idea, with the vision of building a human-oriented, sustainable intelligent transportation environment. This section covers key issues concerning advocating intelligent transportation and corresponding policies and strategies formulated in the 2020 White Paper.

1. Key Issues

Aside from the ninth key issue mentioned in bolstering transportation industry development, current key issues on advocating intelligent transportation applications are as follows:

(1) In response to the changes in intelligent transportation demand and to the development of innovative technologies, the adjustment of transportation service modes must be accelerated

The advances in new information and communications technologies such as the internet of things, cloud computing, big data analytics, artificial intelligence, and the like have opened up countless opportunities for transportation service development and applications. On the other hand, the public increasingly expects better administration quality from the government with an urgent need for real-time traffic information, digitized and mobilized application services, and integrated traffic services. In the past, most transportation information in Taiwan was held by local authorities and transport service providers. The MOTC in recent years has been advocating

traffic data collection and open data. However, local governments have different degrees of information integration and openness. Therefore, the construction of service platforms for exchanging transportation data and information integration and openness should be pushed forward to facilitate the development in diverse application services. Moreover, by observing the recent domestic and international development trends, it is known that developed countries tend to connect different industries to conduct MaaS. On the foundation of integrated transportation services, related operators should cooperate with other consumer packaged goods industries to not only provide innovative transportation services but also change the present operation modes in following the development of horizontal alliances.

(2) To build up and develop an environment for intelligent transportation applications and services, legal and technical standards are required to be adjusted

The intelligent transportation system is composed of complicated components, numerous interfaces and have much to do with many issues

such as cross-organization/cross-system technical standards, equipment standards, the coordination of related laws, and the like. Considering the cooperation of domestic intelligent transportation-related industries and their competitiveness in international markets, industrial standards and technical regulations of intelligent transportation should be in line with international standards. In addition, intelligent transportation nowadays has been put into many applications with new technologies, and demonstration projects and on-site inspection have already been conducted as well. However, during the process, such developments are often restricted by existing laws and regulations. For applying



new technologies and pushing for new intelligent transportation services, the adjustment of related laws and regulations should be accelerated to follow the technical development of practical applications.

(3) To enhance traffic safety and efficiency, intelligent transportation management and related services must be continuously refined

According to statistics and analyses by the National Police Agency, the leading cause of traffic accidents is driver errors. Therefore, new technologies such as automatic driver-assistance systems and the like should be adopted to improve traffic safety and reduce traffic accidents. On the other hand, the density of vehicle detectors (VD), eTag sensors with automatic vehicle identification (AVI), and suchlike equipment still remains to be increased on provincial highways and in all counties and cities. The data collection from traffic accidents and ongoing roadworks also needs to be improved to avoid omissions and achieve better correctness. Moreover, as most traffic management measures are only applied in one single region, congestion often occurs at cross-border points.

(4) In response to the trend of maritime transport digitalization, advance planning should be done by domestic maritime and port authorities

Maritime transport digitalization has gradually become an international trend in the port industry and the shipping industry. Taiwan, compared to other countries, has the great advantage of its prosperous ICT industry, which firmly supports the development of maritime transport and provides huge possibilities in terms of software. Nevertheless, a comprehensive plan still needs to be mapped out for the integration of industry chains and the connection among maritime ports, shipping companies, freight owners, and customs.

(5) In response to the new technology development trend and in order to enhance airport operational efficiency, smart and digital upgrades in airports should be advocated actively

Facing the increasing, diverse service demands of passengers, airports are required to leverage new ICT technologies such as biometric technologies and the like to improve the convenience of travelers and provide them a better boarding environment. In

addition, service innovation should be implemented to complete related software and hardware services and enhance the operational efficiency of airports.

(6) In response to the new technology development trend, smart railways should be advocated

Despite the ongoing development of smart railways in the country, a systematic architecture is lacking, and the lack of experience exchange between different railway systems still remain problematic. Therefore, the latest technologies should be put into practice moderately to push for smarter railways. Measures like safety monitoring, early warning maintenance, patrol inspection of trains, and traveler services should also be prioritized to be implemented.



2.Policies and Strategies

Refer to Figure 11 for policies and strategies regarding advocating intelligent transportation applications. Details of each item are as follows:

(1) Advocate traffic data collection, open data and big data analysis applications (Intelligent Transportation Policy 1 - Strategy 1)

This strategy concentrates on the multiple roles served by government departments, including a portal to open up and supply traffic and transportation data, a cooperation platform, a warehouse, an analysis center, and the like, for all industries to develop value-added applications. Also, by integrating the information from both public and private sectors, accelerating the collection of traffic data, and analyzing various kinds of dynamic and static big data for any potential precious information and future trends, it is possible to develop big data analytics as well as related applications and lay a firm foundation for public policies, transportation management measures, and traffic application services.

(2) Modify laws and regulations to create a robust environment for innovative applications (Intelligent Transportation Policy 1 - Strategy 2)

For the development of new technology applications and new intelligent transportation services, the authorities concerned have to adjust the existing related laws or enact new regulations

to create a robust environment for intelligent transportation applications. This strategy features the exploration and examination of issues such as the legal and technical standards might be faced by intelligent transportation developments in the country and new technologies and innovative service modes, as well as the rolling adjustment of regulations.

(3) Conduct MaaS and ICM (Intelligent Transportation Policy 2 - Strategy 1)

Maturely developed ICT technologies, universal public transportation infrastructure, high information transparency, and suchlike advantages have already enabled Taiwan to develop MaaS applications. This strategy aims to conduct MaaS to put transportation supply and demand chains together on the same platform; this way, transport operators will obtain much more benefits from the market, and passengers will also receive better transportation services. Furthermore, in order to deal with the overlap of all-level traffic control systems, the Ministry will introduce professional technical services of transportation management and develop regional traffic control

strategies and arithmetic methods to establish an integrated traffic control and management system.

(4) Conduct Cooperative Intelligent Transport Systems (C-ITS) and the testing and servicing of unmanned vehicle applications (Intelligent Transportation Policy 2 - Strategy 2)

In terms of conducting Cooperative Intelligent Transport Systems (C-ITS), this strategy aims to achieve three goals: 1) introduce cloud computing technologies into regional traffic management, traffic information, and other practical services to conduct higher-level traffic control, improve the efficiency and road safety of intersections/corridors through the integration of traffic control systems and telematics; 2) integrate the Internet of Vehicles with related applications of connected autonomous driver assistance within the advanced driver assistance system; 3) develop a scooter telematics service system to enhance scooter safety management. Also, the development of unmanned vehicles in Taiwan may raise many related issues such as laws, standards, system efficiency, usage behavior, traffic safety, and the like. Therefore, this strategy is targeted at the

exploration and coordination of these issues and also keep an eye on the development of related applications abroad to shorten the gap between planning and practice. Moreover, by conducting on-site tests of unmanned vehicles and introducing regulatory sandboxes, service modes of unmanned vehicle applications suitable for Taiwan could be thus developed.

(5) Develop AI-related applications (Intelligent Transportation Policy 2 - Strategy 3)

This strategy emphasizes introducing applications of new equipment, new technologies, and cross-field information, expanding the coverage of traffic data, and increasing the capability of traffic data collection and application. Additionally, AI-related applications are also introduced into traffic management and traffic control, including the improvements of traffic management measures, traffic data collection, automatic incident detection, ramp metering, traffic signal control, and the like, in order to enhance the efficiency and traffic safety of the transportation system.



(6) Conduct smart transformations of maritime and ports (Intelligent Transportation Policy 3 - Strategy 1)

This strategy concentrates on leveraging the developed ICT technologies of Taiwan, introducing related technologies, improving maritime operating procedures, reinforcing the effectiveness of all information systems in maritime ports, and thus facilitating the development of smart maritime ports in Taiwan.

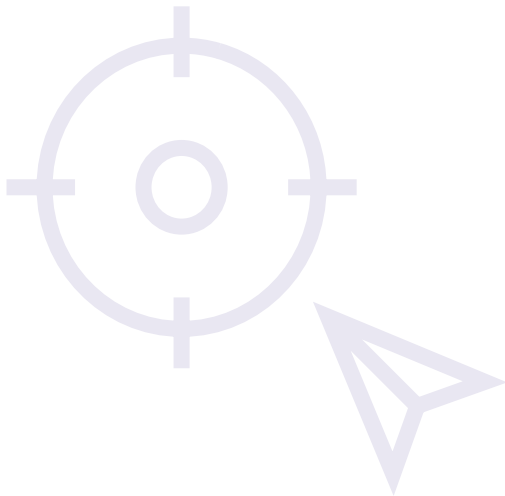
(7) Continue to advocate smart, digital airports (Intelligent Transportation Policy 3 - Strategy 2)

This strategy aims to launch the advance planning of smart airport development and the introduction of intelligent designs into terminal facilities, apply more intelligent and digital technologies to airports to enhance airport service quality.

(8) Advocate smart railways(Intelligent Transportation Policy 3 - Strategy 3)

This strategy goes at introducing intelligent technologies such as AI, the Internet of Things, big data, cloud computing, mobile and network communication, among other ICT technologies,

integrating railway knowledge, and utilizing ICT digital technologies in combination with the operational technology (OT). In addition, the strategy also attends to collect big data for railways, establish analytical models, predict future trends, offer railway safety monitoring, early warning maintenance, train patrol inspection, traveler services, among other applications, and carry out advanced decision management, in order to enhance rail safety and operational efficiency, improve railway operational quality, and thus realize the core values of safety, accuracy, service, and the like.

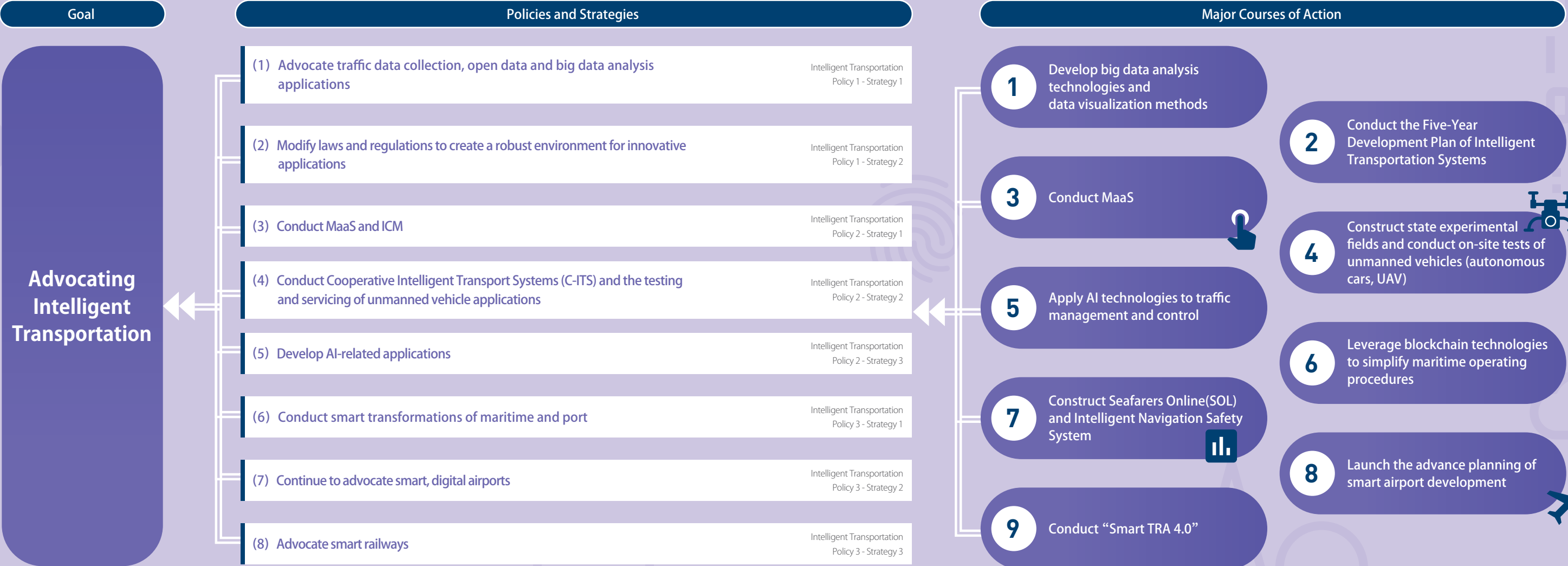


3.Major Courses of Action

Major courses of action responding to the aforementioned policies and strategies are as follows:

- 1 Develop big data analysis technologies and data visualization methods;
- 2 Conduct the Five-Year Development Plan of Intelligent Transportation Systems;
- 3 Conduct MaaS;
- 4 Construct state experimental fields and conduct on-site tests of unmanned vehicles (autonomous cars, UAV);
- 5 Apply AI technologies to traffic management and control;
- 6 Leverage blockchain technologies to simplify maritime operating procedures;
- 7 Construct Seafarers Online(SOL) and Intelligent Navigation Safety System;
- 8 Launch the advance planning of smart airport development;
- 9 Conduct “Smart TRA 4.0”.

Figure 11 Strategies to Achieve the Goal of Advocating Intelligent Transportation



3.8



Pursuing Global Green Trends

Pursuing Global Green Trends

Issue Greenhouse gas emissions in the transportation industry make up 26% of the total amount in the transportation sector

Strategies •Encourage the transportation industry to reduce its greenhouse gas emissions



Issue The habit of using private vehicles is hard to change, and transportation demand management should be improved

Strategies •Reinforce transportation demand management and build up an environment beneficial to public transportation



Issue Vehicles depend heavily on fossil fuels and thus derive emissions that harm people's living environment

Strategies •Discard high-polluting and high-energy-consuming vehicles and promote transport electrification



Issue Air pollution and carbon dioxide emissions produced in the transportation terminals have affected people's health and the environment

Strategies •Fasten more efficient measures to conserve energy, reduce carbon dioxide emissions and air pollution in the transportation terminals

Issue Need breakthrough enhancement adhering to the fast developing transport technologies in energy efficiency of transportation systems and vehicles

Strategies •Employ intelligent transportation system and raise energy efficiency standards for vehicles



Issue Need to comply with international conventions and technology developments of green maritime and aviation technologies to keep pace with international standards

Strategies •Encourage green aviation and shipping developments

Issue Need to adapt to the continuous volume growth in passenger and freight transportation by planning upgrades to railway and highway infrastructure and developing island-round coastal shipping beforehand

Strategies Construct high energy-efficient green transportation networks



Due to climate change, air pollution, and other environmental issues attract more and more attention globally, pursuing global green trends has been one of the major policies to tackle these issues. Green transportation means fostering the development of public transportation to reduce private transport usage, conducting transport electrification, enhancing transport energy efficiency, and suchlike measures to cut carbon dioxide emissions and air pollution. This section covers key issues concerning green transportation and corresponding policies and strategies formulated in this 2020 White Paper.

1. Key Issues

Current key issues concerning pursuing global green trends are as follows:

(1) Administration of highway public transportation operation have not kept pace with the changing needs of the market and then amending laws and regulations is needed

Innovative business models are not yet well regulated. For example, consumer disputes may arise from the unclearly granted operational areas and responsibilities between car sharing matching platform operators and existing public transport service operators. As a result, amendments should be proposed to meet market demands.

(2) Promotional campaigns of highway public transportation should be further improved by providing diverse marketing methods and various channels

The efforts promoting adoption of bus transportation have not proactive enough and lack

of diversity. Rather, the promotion of transportation should be integrated with passengers' needs, such as lodging, dining, and shopping packages. Besides, provided that Taiwan residents are accustomed to chauffeuring schoolchildren by private vehicles, encouraging children to experience public transportation could also be one of the diverse methods to reinforce promotions of highway public transport.

(3) Vehicles depend heavily on fossil fuels and thus derive emissions that harm people's living environment; policies for reducing carbon dioxide emissions and air pollution should be enhanced

In Taiwan, diesel and petrol accounted for 97% of vehicles' fuel consumption in 2018. Burning such

fossil fuels produces greenhouse gases, and vehicle exhaust emissions from tailpipes of diesel and petrol engines are also a major source of air pollution, making negative impacts on the entire environment and public health. In recent years, electric vehicles are strongly advocated domestically and abroad for their zero tailpipe emissions to reduce vehicles' dependence on fossil fuels directly and tackle the problems of greenhouse gas emissions and air pollution. Yet, such zero-emission vehicles using new energy are still developing, and the authorities should consider how to give people more incentives, release the resistance of adoption, and foster the development and upgrading in related industries. Moreover, highway public transportation fleets consist mainly of diesel buses, which emit harmful emissions from tailpipes and seriously impact the public health. Hence, it is the duty of MOTC to encourage bus transportation operators to adopt electric buses in order to provide people with clean and high quality public transportation services.



(4) The habit of using private vehicles is hard to change, and transportation demand management should be improved

Vehicles that have a higher loading capacity usually have a better energy efficiency. Studies show that cars and scooters consume energy 1.1 to 1.3 times as much as buses do, 3 to 4 times as rail transport does on a per person basis. Public transport has long been one of the major green transportation policies for its high capacity advantage. However, its relatively less convenience has also long been an obstacle to adoption. Therefore, changing people's habit of modal choice will be one of the key elements for successful green transportation.

(5) Air pollution and carbon dioxide emissions in transport terminals have affected people's health and the environment; prevention measures should be designed and implemented

The electricity consumption in transport terminals is increasing year by year. This is because transport terminals have been successively opened up along with the continuous expansion of rail transportation systems, maritime and aviation transport networks.

The electricity consumption rises obviously because of the increase of underground stations especially. Related transport operators should emphasize and launch related electricity-saving measures so that to reduce the greenhouse gas emissions from electricity generation. Besides, some places such as bus lanes and underground rail stations are affected by the dense, high-concentration particulate matter (PM) discharged respectively from diesel buses or trains. Shipping emissions in ports also affect the local air quality, causing health risk to residents and workers in surrounding regions. In such places, air pollution prevention measures should be proposed and carried out, and the concentration of pollutants should be regulated.

(6) Need a breakthrough improvement of energy efficiency of vehicles and transportation systems via new transport technology

First of all, the energy efficiency of automobiles in Taiwan has been increasing every year. Still, it is required to continue raising automobile efficiency standards moderately in response to global automotive technology developments in the future.

Secondly, in terms of the energy efficiency of the overall transportation system, breakthroughs with new technologies apart from enhancing energy efficiency should also be explored. For example, with intelligent transportation technologies becoming more and more mature, individual travel's energy efficiency can be enhanced by avoiding traffic congestion, optimizing routes, reduce the waiting time, and the like. As for transportation infrastructure, in order to maintain and keep improving the service quality of transportation systems along with the increasing of the passenger and freight transportation volumes, further improvement of railway and highway infrastructure and expansion of island-round coastal shipping should be conducted as soon as possible. So that the current bottlenecks of railway and highway systems can be solved and the railway and highway systems can work fully functionally

in the near future, and thus make the whole transport network high energy efficient and green.

(7) The transportation industry need to be involved in the carbon emissions management system to follow up the energy conservation and carbon reduction trend

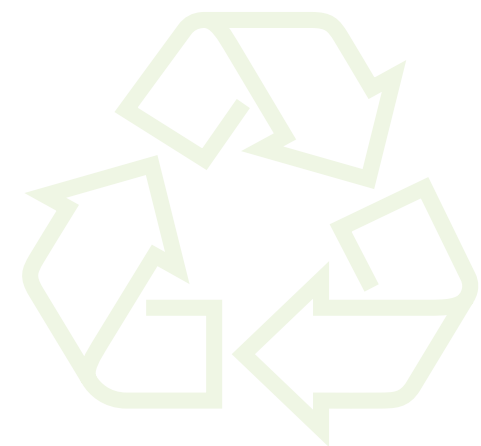
According to Article 14 of the Greenhouse Gas Reduction and Management Act, transportation administration authorities have the responsibility to guide and help transport operators to conduct the inventory, verification, registry, and reduction of greenhouse gas emissions, as well as to participate in the GHG Offset Project. In Taiwan, greenhouse gas emissions in the transportation industry make up 26% of the total amount in the transportation sector in 2018. Hence, it is essential to exploit resources as soon as possible to support transport operators to reduce carbon dioxide emissions.

(8) Green aviation and green ports need to be developed to follow up international sustainable environment policies

To advance the green air transportation, the



thoughts of managing air transport should be adjusted to include green and environmental protection concepts, as well as related global aviation regulations and technologies, in the operation of airports and aviation operators. As for shipping, green shipping should be developed to reduce the influence of pollution discharged from ships upon the environment by abiding by international conventions. So that the environment quality in cities adjacent to ports and the development of local cities can be improved.



2.Policies and Strategies

Refer to Figure 12 for policies and strategies regarding pursuing global green trends. Details of each item are as follows:

(1) Propose amendments in response to the innovative operation mode development of highway public transport (Urban Transportation Policy 3 - Strategy 1)

With the thriving sharing economy ideas and universal mobile applications, myriad innovative services keep appearing such as Demand Responsive Transit Service (DRTS), which providing customized reservation service of transportation, and Mobility as a Service (MaaS), which offering public transportation services by integrating diverse modes. This strategy concentrates on upgrading transportation industry and ensuring consumers' interests via proposing amendments for innovative operational modes.

(2) Encourage people to use highway public transportation by diverse promotional campaigns (Urban Transportation Policy 3 - Strategy 2)

The current promotional information of highway public transportation are mainly broadcasted via the Internet; therefore, the accessibility to the information is poor in remote rural areas or to the elderly. This strategy aims to enhance promotional effectiveness of information by using village chiefs' offices as promotional channels, which make information accessible to people who are less connected to the internet. As a result, the ridership of new bus routes or event shuttle services could be improved. Besides, learning from the approaches used abroad, it is helpful to cooperate with household registration authorities to provide new residents with information of nearby bus routes and other public transport information, so as to encourage them to use public transportation. Furthermore, it is beneficial to attract more passengers by cross industry alliances, such as involving highway public transportation into marketing campaigns integrated with public transportation tickets, lodging, dining, and shopping services, in order to design tours

by bus and/or other public transportation with ticket packages. In addition, it is necessary to keep planning related activities to make people, especially schoolchildren, experience the comfort and convenience of traveling by bus and other public transportation and learn how to efficiently ride these modes, in order to help them develop the ability and habit of using public transportation and reduce their dependence on private vehicles. For frequent bus users, their dependence on public transportation could be further enhanced with related promotional campaigns.

(3) Reinforce transportation demand management and build up an environment beneficial to public transportation (Green Transportation Policy 1 - Strategy 1)

Road users heavily rely on private vehicles to fulfill their travel need, posing great challenges to greenhouse gas and air pollution reduction. As a result, this strategy aims to promote public transportation and cooperate with local traffic departments to reinforce and implement transportation demand management measures,

as well as to create an environment beneficial for people to adopt public transport and reduce the use of private vehicles..

(4) Promote transport electrification(Green Transportation Policy 1 - Strategy 3)

The government has carried out related cross-ministerial programs to conduct transport electrification, with an aim to meet people's needs of convenient mobility, stimulate the development

of related electric vehicle industries, and achieve the goals of greenhouse gas reduction and air pollution prevention. This strategy aims to continue giving rewards and subsidies to people and public transportation operators to purchase electric vehicles, increasing charging facility installation, facilitating charging service, in order to raise the penetration and usage of electric vehicles. In addition, the electrification of island-round railways is about to be completed, reaching the unification of railway power, which not only makes train operation and dispatch arrangements more convenient but also shift road transportation to railway and reduces the use of vehicles and emissions on highways.

(5)Discard high-polluting, high-energy-consuming vehicles (Green Transportation Policy 1 - Strategy 4)

This strategy inclusively considers both buses and private vehicles, cooperates with related programs of the Environmental Protection Administration, and coordinately applies incentive and regulation measures, such as giving subsidy and limiting polluting vehicles by setting the air

quality maintenance zones. The subsidy program is applicable to both technically improving of existing vehicles and replacing an old vehicle with a new one. This strategy offers people and transportation operators diverse options to achieve the goals of carbon reduction, pollution reduction and sustainable transportation.

(6) Employ intelligent transportation system and raise energy efficiency standards for vehicles (Green Transportation Policy 1 - Strategy 5)

The Ministry has expanded the development scale of intelligent transportation systems since 2017 to provide human-vehicle-road integrated application services suitable for the traffic environment in Taiwan. This strategy tries to enhance the overall efficiency of transportation systems to save energy and reduce carbon emissions. In addition, in order to improve transport energy efficiency, the Ministry of Economic Affairs has launched projects to raise vehicle energy efficiency standards, solidly implement the management of energy efficiency labeling and promote eco-driving cooperatively with the environmental protection departments.

(7) Fasten more efficient measures to conserve energy, reduce carbon dioxide emissions and air pollution in the transportation terminals (Green Transportation Policy 1 - Strategy 6)

To combat air pollution and reduce energy consumption in terminals, based on cross-ministerial programs of the Executive Yuan, this strategy additionally stresses on the reinforced self-regulation of transportation departments in central and local levels. The Ministry works with transportation terminal operators to reduce energy use, carbon dioxide emissions, and air pollution in the transportation terminals with management measures and operational regulations.

(8) Construct high energy-efficient green transportation networks (Green Transportation Policy 1 - Strategy 7)

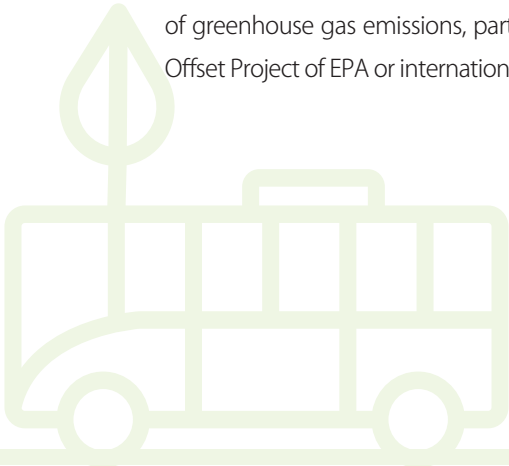
In response to the increasing passenger and freight volumes, this strategy attends to maintain and improve the service quality of transportation systems. The Ministry is constructing green transportation networks by driving the construction of highway public transport transfer stations, improving freeway



and expressway networks, constructing island-round high-efficiency railway networks, and building freight transshipment terminals for the island-round Blue Highway, in order to raise the energy efficiency of transportation systems.

(9) Encourage the transportation industry to reduce its greenhouse gas emissions (Green Transportation Policy 2 - Strategy 1)

Authorities of the transportation industry in Taiwan have been encouraging transport operators to apply for carbon labels. Besides, the construct a greenhouse gas registry platform for aviation companies has put into operation. This strategy emphasizes supporting transport operators to conduct the inventory, verification, registry, reduction of greenhouse gas emissions, participate in the GHG Offset Project of EPA or international offset programs.



(10)Encourage the development of green ports and green shipping (Green Transportation Policy 2 - Strategy 2)

This strategy aims to develop green ports and EcoPorts as well as strive for international certifications. Besides, coastal maritime is encouraged to replace road transportation. In terms of ships, it is vital to continue pushing for ship speed reduction when entering ports, run on low-sulfur fuels for international routes, using shore power, and adopt other feasible measures. The development of green shipping is encouraged in response to international conventions.

(11)Implement the development of green aviation (Green Transportation Policy 2 - Strategy 3)

This strategy includes encouraging airports and airlines to include green concept of environmental protection into their operation and also pay attention to related developments of regulations and technologies around the globe, in order to foster the development of green aviation.

3.Major Courses of Action

Major courses of action responding to the aforementioned policies and strategies are as follows:

- ➊ Enhance the service quality of public transport;
- ➋ Give guidance to all transport operators to drive greenhouse gas emissions reduction projects;
- ➌ Conduct bus electrification (includes city buses, national highway buses and general highway buses)by 2030;
- ➍ Improve indoor air quality in underground stations of rail transports;
- ➎ Improve the freeway and expressway networks;
- ➏ Construct island-round high-efficiency railway networks (High Speed Rail in the western corridor and express rail in the eastern corridor);
- ➐ Encourage ports in Taiwan to obtain the European Eco Ports certification;
- ➑ Encourage international airports in Taoyuan and Kaohsiung to participate in Airport Carbon Accreditation and receive certifications.

Figure 12 Strategies to Achieve the Goal of Pursuing Global Green Trends



IV. Meticulous Process of Feasible Policies

The 2020 Transportation Policy White Paper was drafted and edited by the Institute of Transportation, MOTC. The drafting process included both top-down guidance and bottom-up steps. The content of top-down guidance includes the major goals and guiding policies of the Executive Yuan, as well as the vision and core elements of policy of MOTC, as shown in Figure 13. The bottom-up steps start sequentially by linking to global changes and development trends, identifying key issues, and finally developing and proposing corresponding policies and strategies, as well as formulating major courses of action, as shown in Figure 14.

Figure 13

Top-down Policy Formulation Approach

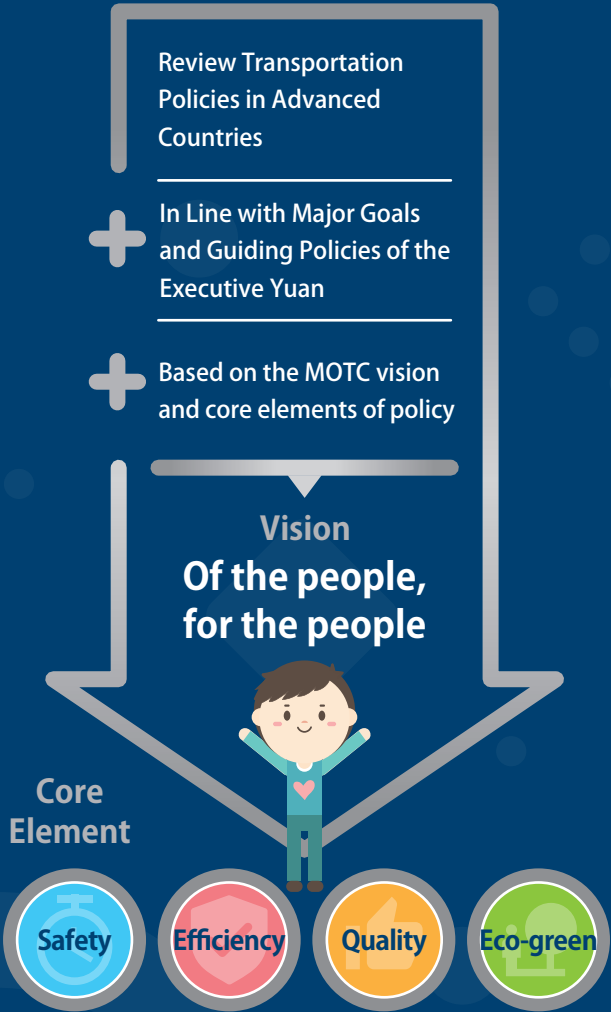


Figure 14

Bottom-up Policy Formulation Approach





The 2020 Transportation Policy White Paper includes seven different volumes ranging from land transportation, sea transportation, air transportation, transportation safety, intelligent transportation, green transportation, to climate change adaptation and disaster prevention. The seven volumes were then summarized into one summary volume.

Since March 2018, during the periods of identifying current key issues, developing and proposing corresponding policies and strategies, the Institute of Transportation hosted conferences to discuss the contents of each of the seven volumes with experts from business, administrations, universities, and institutes.

After the first draft had been finished, internal meetings were held by leaders of all units within the various transportation departments and affiliated organizations to review the contents and propose revisions. After all suggestions were collected and the draft was revised for the first time, in addition to the aforementioned professionals, the Institute of Transportation also invited transportation authorities from 22 counties and cities to participate in the symposium. Following the second revision of the seen volumes and the compilation of the summary volume's first draft, the political deputy minister of MOTC convened a meeting of senior officers from all units within the various transportation

departments and affiliated organizations to discuss and confirm the contents of the eight volumes. Such thorough, meticulous drafting process ensures that all opinions from business, administrations, academic organization have been taken into consideration and a universal consensus has been achieved as well.



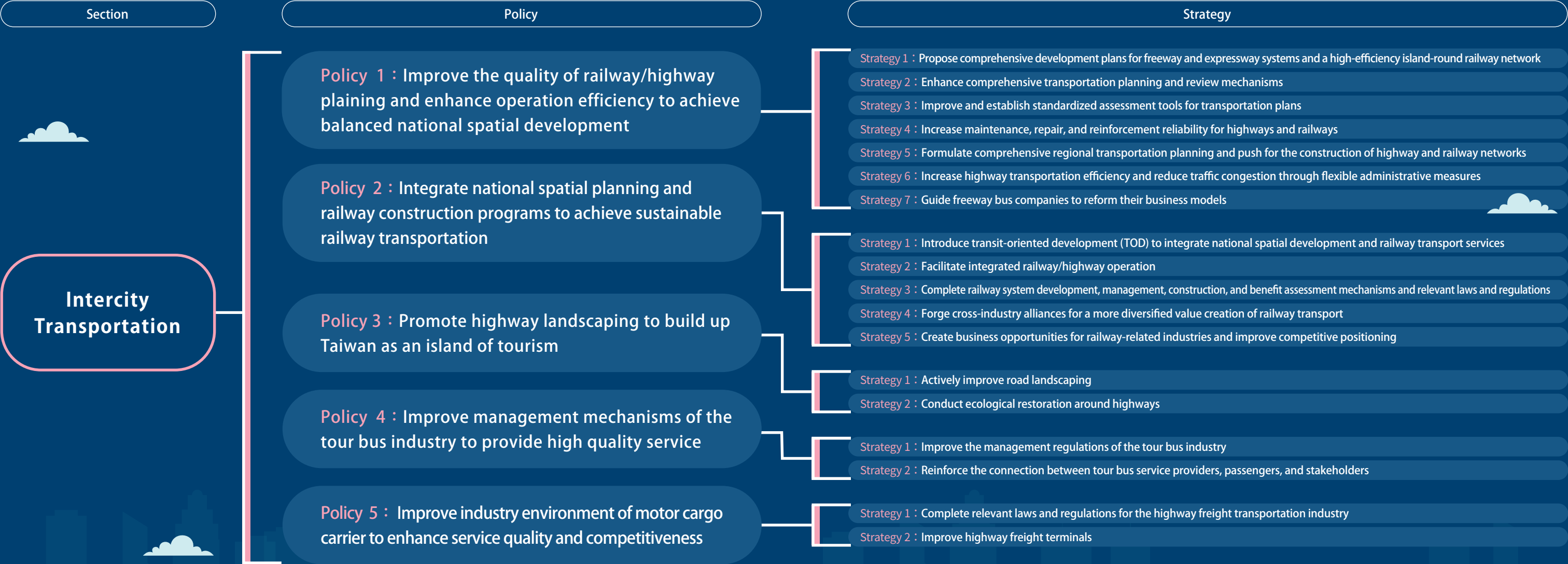
Under this meticulous drafting process, the 2020 Transportation Policy White Paper has set 2030 as the target year, not only proposing 27 policies and 107 strategies but also developed short, medium, and long-term courses of action, which will be conducted respectively by 2020, before and after 2022. With the active participation of all units and departments within the Ministry in the discussion, every course of action is able to closely follows the administrative plans and budgets of, along with a clear division of organizers and co-organizers in charge (exemplified in Table 1), fully showing the positive feasibility of the strategies.

Table 1 **Sample Course of Action-**
Intercity Transportation Policy 2: Integrate national spatial planning and railway construction programs to achieve sustainable railway transportation

☰ Strategy	📋 Courses of Action		👤 Organizer	👥 Co-organizer	📅 Launched in		
					~2020	~2022	2022~
Strategy 1: Introduce transit-oriented development (TOD) to integrate national spatial development and railway transport services	Reassess local development with national industry upgrade policies; introduce collaborate with private develop land surrounding	needs to conform with national industry transformation and ideal businesses; investment projects to stations	Railway Bureau, Railway Operators	Local Governments		✓	
	Integrate railway planning to achieve the development (TOD)	constructions with urban goal of transit-oriented	Department of Railways and Highways, Ministry of the Interior, Railway Bureau	Railway Operators, Local Governments		✓	
	Integrate resources from to promote cross-domain improve coordination with	governmental agencies collaboration and local governments	Department of Railways and Highways, Ministry of the Interior, Railway Bureau	Railway Operators, Local Governments		✓	
Strategy 2: Facilitate integrated railway/highway operation	Review the performance of system and prioritize access tool	integrated HSR access railways as the main	Railway Bureau	Railway Operators, Directorate General of Highways, Local Governments	✓		
	Increase the regional of TRA	transportation efficiency	Taiwan Railways Administration	Railway Bureau	✓		
	Improve the railway/highway	transfer discount system	Local Governments	Railway Bureau, Railway Operators, Directorate General of Highways	✓		
	Establish standardized public mechanisms through and passenger cars	transportation transfer barrier-free train stations	Taiwan Railways Administration	Railway Bureau	✓		
	Integrate railway tickets with with mobile payment stop service	MaaS and collaborate operators to provide one-stop service	Local Governments, Taiwan High Speed Rail Corporation, Taiwan Railways Administration	Railway Bureau, Office of Science and Technology Advisors		✓	

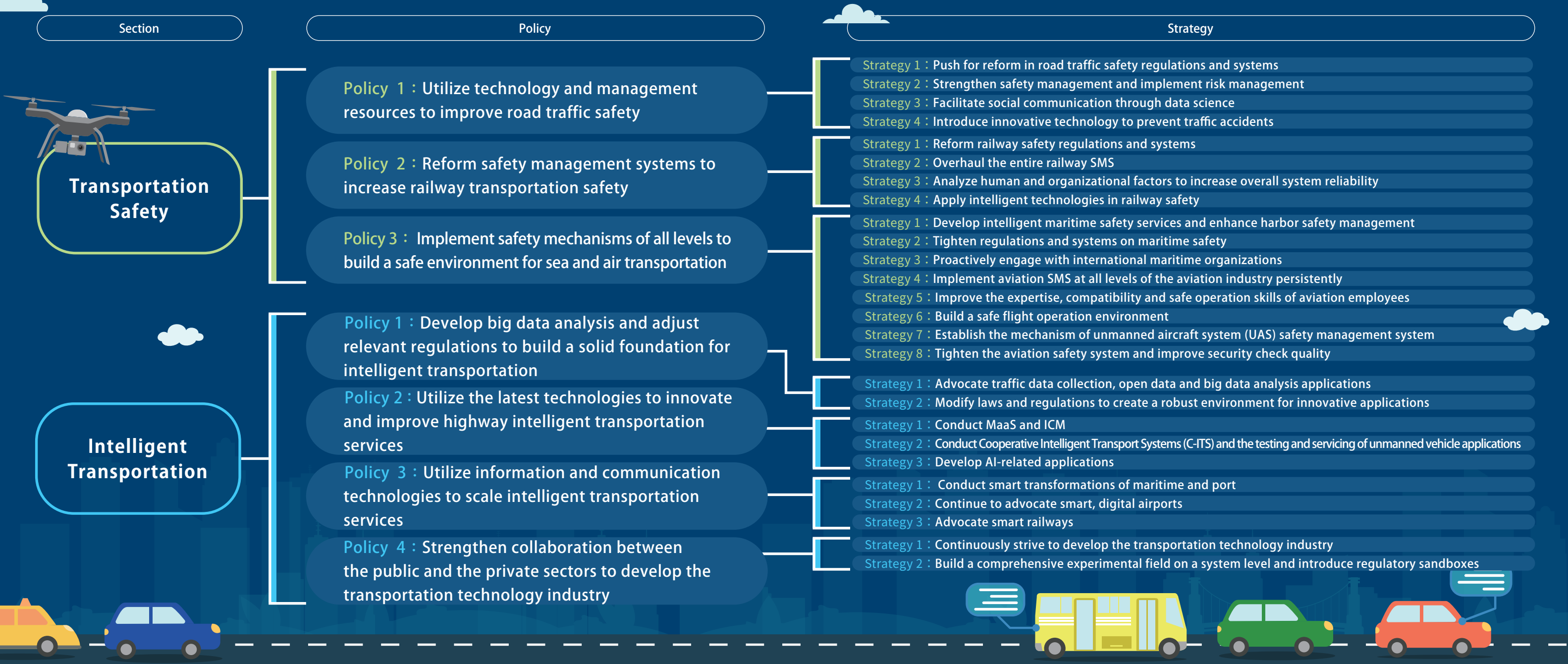
Appendix Policies and Strategies by Sections

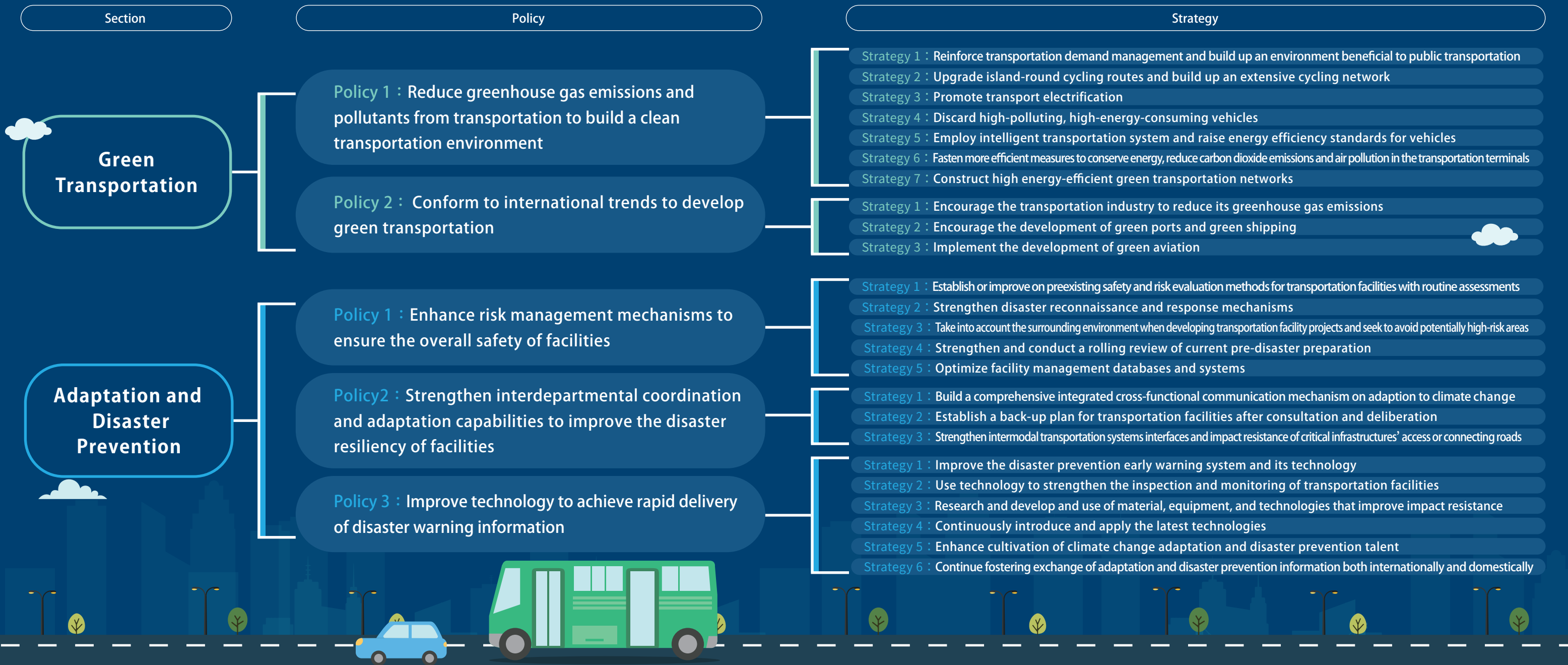
Section	Policy	Strategy
International Transportation	Policy 1 : Plan properly and continue on constructing to improve port operating performance 1.	Strategy 1 : Improve port infrastructure and strengthen operational partnerships Strategy 2 : Conduct practical assessments of opportunities for diversified port operations by the perspective of intergrating resources Strategy 3 : Provide barrier-free maritime passenger transport from a human-oriented perspective
	Policy 2 : Develop comprehensive regulations and integrate resources to boost the shipping industry	Strategy 1 : Build a better business environment for the shipping industry Strategy 2 : Formulate comprehensive overseas investment plans Strategy 3 : Promote interaction between Chinese and Taiwanese sea transportation authorities Strategy 4 : Develop complete maritime regulations and port infrastructure for the renewable energy industry Strategy 5 : Enhance maritime talent cultivation Strategy 6 : Develop regulations governing international re-export and value-added export services in the Free Trade Zones
	Policy 3 : Propose infrastructure projects to provide exceptional aviation facilities and environment	Strategy 1 : Implement core construction projects for Taoyuan International Airport Strategy 2 : Proactively engage with international civil aviation organizations Strategy 3 : Conduct airport development plans in accordance with the position of each airport and continue to enhance operational resilience Strategy 4 : Continuously improve air navigation services and facilities Strategy 5 : Highlight airport features and provide human-oriented friendly services
	Policy 4 : Build a well business environment to boost the aviation and related industries	Strategy 1 : Actively expand Taiwan’s international aviation network Strategy 2 : Integrate labor resources and promote flexible labor distribution Strategy 3 : Enhance civil aviation talent cultivation Strategy 4 : Ensure steady operation of Taiwanese airline carriers and fulfill consumer protection Strategy 5 : Provide necessary support to improve the competitive positioning of aviation industry operators



Section	Policy	Strategy
Urban Transportation	Policy1 : Integrate urban development and transportation management to construct human-oriented transportation environment	Strategy 1 : Formulate urban transportation planning with the concept of transit-oriented development (TOD) Strategy 2 : Introduce human-oriented concepts to urban design and management Strategy 3 : Increase off-street parking spaces and improve parking efficiency
	Policy 2 : Keep promoting the development of highway public transportation and enhancing barrier-free transportation service to achieve the goal of human-oriented transportation	Strategy 1 : Improve bus service quality and reduce travel time and costs Strategy 2 : Enhance barrier-free bus transport services Strategy 3 : Improve seamless transport services and increase transfer incentives
	Policy 3 : Improve the legal system, promotional campaigns, labor provision, and financial sources to further develop highway public transportation	Strategy 1 : Propose amendments in response to the innovative operation mode development of highway public transport Strategy 2 : Encourage people to use highway public transportation by diverse promotional campaigns Strategy 3 : Address labor shortage in the bus industry and authorities with diverse measures Strategy 4 : Explore additional financial sources with diverse measures to develop highway public transportation
	Policy 4 : Build a sound business environment for the car rental and taxi industries and provide diversified, safe, and convenient transportation services	Strategy 1 : Improve the business environment for car rental and taxi industries Strategy 2 : Provide care to taxi drivers and encourage them to join the wheelchair accessible taxi (WAT) market
Offshore Island and Rural Transportation	Policy 1 : Sustain the basic mobility of offshore island residents with tourism and promote sustainable sea and air transportation	Strategy 1 : Build a stable business environment for Taiwan’s civil aviation industry Strategy 2 : Improve port infrastructure and maritime transport route planning for offshore islands Strategy 3 : Optimize port passenger facilities and services from the passengers’ perspectives Strategy 4 : Construct the Blue Highway of maritime passenger transport with integrated port and tourism resources
	Policy 2 : Improve the basic mobility of rural residents and improve the safety and convenience of transportation services	Strategy 1 : Maintain regular road services in rural mountain areas Strategy 2 : Ensure sustainable operations with an improved subsidy mechanism for rural bus services Strategy 3 : Adopt flexible operations for better highway public transport services in rural areas Strategy 4 : Propose amendments to facilitate highway public transport development in rural







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